LONDON SCHOOL OF TROPICAL MEDICINE
NOT TO BE TAKEN AWAY.

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INCLUDING

CEYLON AND BURMA.

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EDITED BY W. T. BLANFORD.

ARACHNIDA.

BY

R. I. POCOCK.

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ALERE FLAMMAM.

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PREFACE.

This volume contains descriptions of all the species of Arachnida of the orders Scorpiones (Scorpions), Uropygi (Whip-Scorpions), Amblypygi, Solifugæ, and of most of the larger and otherwise conspicuous species of Araneæ (true Spiders) known to occur in British India, Burma, and Ceylon, together with diagnoses of the genera, families, and suborders into which they fall. The only innovation introduced into the usually accepted classification of these groups is the ordinal separation of the Uropygi and Amblypygi, which are generally united as one order Pedipalpi.

All the described species of the first four orders are dealt with in full. The Araneæ, however, are less thoroughly treated, only the larger forms being included in the present work. These embrace all the Mygalomorphæ, a group comprising the species commonly known as "Mygales" and Trap-door Spiders, all of which are of medium or large size, and also a relatively small number of the described species of Arachnomorphæ. This latter group contains a vast number of species and is still very imperfectly known—so imperfectly that no satisfactory account of it can at present be given. All that has been attempted is to afford means of identifying the larger, commoner, better known and more widely distributed forms. As regards size no species which when adult falls short of 5 mm. in total length has been

included, and a preference has been given to those forms of which specimens were available for description. It is to be hoped that the present work, by facilitating the study of Indian Spiders, will increase the number of observers and collectors, so that at some future time a far more complete account of these animals may become practicable.

I welcome this opportunity of expressing my grateful acknowledgments to those who have rendered the work possible by lending or collecting specimens: to Major Alcock, I.M.S., Superintendent of the Indian Museum, Calcutta, for the loan of typical examples of species described by Stoliczka and Simon, and to Dr. R. Gestro for extending to me the same kindness in connection with types of species described by Thorell and preserved in the Museo Civico at Genoa. The help that I have received from many friends and strangers, too numerous to thank in detail, is acknowledged in the following pages. Especially am I indebted to Mr. R. C. Wroughton, of the Indian Forest Service, and to Mr. H. M. Phipson, Honorary Secretary of the Bombay Natural History Society, whose influence and energy in procuring material have vastly increased our knowledge of Indian Arachnology.

R. I. POCOCK.

October 16th, 1900.

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CORRIGENDUM. (Pp. 206–207.)

Sections a^5, b^5, a^6, b^6 of Synopsis to be altered as follows :—

a^5. Posterior spiuuers absent or much shorter thau anterior.

a^6. Upper lip membranous ; maxillæ without crest on upper side .... *Zodariidæ.*

b^6. Upper lip horny ; maxillæ with crest on upper side .. .. *Palpimanidæ.*

b^5. Posterior spinners present, not perceptibly shorter than anterior.

ARACHNIDA.

The Arachnida may be distinguished from the Hexapoda (Insects), Chilopoda (Centipedes), and Diplopoda (Millipedes) by the entire absence of the pair of feeler-like appendages, known as antennæ, which are affixed to the front of the head in these three classes of animals, and also by the fact that there is no differentiated head furnished with two or three pairs of appendages modified so as to act solely as jaws. In the remaining great class of Arthropoda—the Crustacea,—which possesses numerous terrestrial species, there are two pairs of antenniform appendages at the anterior end of the body and at least three pairs of appendages modified as jaws.

The Arachnida may be characterized in detail as follows * :—

Arthropodous animals in which the body in the adult is never composed of more than eighteen segments (*somites*) and is divisible into two main regions—an anterior or cephalothorax, and a posterior or abdomen.

The *cephalothorax* consists of six somites, each of which is provided with a pair of appendages. The somites are usually welded together and covered above by a dorsal shield or *carapace*; rarely the posterior two somites remain distinct from the others, and are furnished with one or two dorsal plates, separate from the main portion of the carapace. The carapace is then said to be segmented. The ventral surface of the cephalothorax is typically supplied with one or more median plates (*sterna*); sometimes the sterna are partially or wholly obliterated by the ingrowth of the basal segments of the appendages, which meet in the median ventral line. Sometimes the sternal plates are united, and form a single ventral plate to the cephalothorax.

Eyes.—Except in some degenerate forms, the fore part of the carapace, sometimes called the cephalic or head-region, is furnished with simple eyes, which in undegenerate species are usually eight in number, two being situated close together in the middle line (*median eyes*), and three on each side (*lateral eyes*), set in a cluster or separated from each other.

Mouth.—The mouth is a minute aperture placed near the lower part of the anterior extremity of the cephalothorax. It is bordered above by a membranous or horny upper lip (*labrum*), and usually below by the anterior sternal plate which acts as a lower lip or *labium*.

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* Some of the degenerate Mites and Ticks furnish exceptions to many of the characters contained in this definition.

Appendages.—The appendages forming the first pair (*mandibles, cheliceræ*) are situated close together beneath the front edge of the carapace above the mouth. Each consists of two, rarely of three, segments, and is very frequently pincer-like or chelate, the terminal segment (*movable finger* or *digit*) closing against a prolongation of the penultimate segment. This prolongation is called the *immovable finger*. In other cases the terminal segment closes against the penultimate segment without the interposition of a finger-like prolongation. The appendages forming the second pair (the *palpi* or *chelæ*) are usually large, but are very variable in function and form, being sometimes prehensile and pincer-like, when they are termed *chelæ*, sometimes tactile and leg-like, when they are termed *palpi*. Each typically and almost invariably consists of six segments, which, although strictly homologous throughout the class, have unfortunately in descriptive works received different names in different orders, largely on account of the failure of authors to recognize this homology. The basal segment is termed the *coxa*, or, when it acts as a masticator of food, the *maxilla*. It is often furnished with a process, the *maxillary process*, which projects forwards beneath or on one side of the mouth. The second segment is termed the *trochanter*; the third the *femur* or *humerus*; the fourth the *tibia* or *brachium* when the limb is chelate, or *patella* when it is pediform; the fifth and sixth are termed respectively *hand* and *movable finger* in the former case, *tibia* and *tarsus* in the latter. To the tip of the sixth is typically affixed a *claw*, which may be either freely movable or fused to the segment and scarcely distinguishable from it. The remaining four pairs of appendages, spoken of collectively as the *legs*, are generally similar or subsimilar in form and subserve locomotion. The first of these four pairs, however, sometimes acts as a tactile organ, and is not used for progression but is carried raised from the ground. Typically these limbs consist each of seven segments, named from base to apex as follows: *coxa, trochanter, femur, patella, tibia, protarsus, tarsus*. The tarsus is tipped with two or three claws, rarely with one, and may be secondarily subdivided into two or more segments.

Abdomen.—The abdomen is generally without appendages. When present they are of small size, are set apart for purposes of reproduction and silk-spinning, and are never used for locomotion. The abdomen is either distinctly segmented, being furnished above with a series of dorsal plates (*terga*) and below with a corresponding series of ventral plates (*sterna*); or no such plates are developed, and the visible external signs of segmentation are either wanting or obscure. At most there are twelve distinct somites in this region, though sometimes there is a skeletal piece movably articulated to the last, above the anal aperture. When this structure is present, the last segment and two or more of those that precede it are narrowed and form with the postanal sclerite the so-called *tail*. Both terga and sterna of the abdomen are generally pitted with a pair of scars (*sigilla* or *impressions*) which mark the point of attachment of a series of internal dorso-ventral muscles.

Internal organs.—The *generative organs* open upon the ventral side of the first or second abdominal somite, beneath either the sternum or a movable plate, the *genital operculum.* The *respiratory organs* also open upon the ventral side of the abdomen, communicating with the exterior by means of apertures (*stigmata*) situated upon or behind some of the anterior sternal plates. Rarely there is a pair of stigmata on the ventral side of the cephalothorax. The organs themselves consist either of horny branching tubes, the *tubular tracheæ,* or of *pulmonary sacs* supplied with fine leaf-like lamellæ.

The Arachnida are viviparous or oviparous. The young are born or hatched from the egg in a form substantially resembling their parents, and, except in the case of the Acari (Mites and Ticks), growth is not accompanied by metamorphosis, the characters of the adult being gradually assumed with each successive moult of the integument.

Classification.—Setting aside the marine form *Limulus,* and also the two degenerate groups *Tardigrada* and *Pentastomida,* whose claims to be regarded as Arachnida are somewhat slender, the members of this class may be grouped into the following orders :—1. SCORPIONES; 2. UROPYGI; 3. AMBLYPYGI; 4. ARANEÆ; 5. SOLIFUGÆ; 6. PALPIGRADI; 7. PSEUDOSCORPIONES; 8. OPILIONES; 9. ACARI *. With the exception of the *Palpigradi,* which, so far as is known, are confined to Central and South Europe, all these orders are represented by numerous species and genera in British India. They may be briefly diagnosed as follows :—

a. Abdomen very long, consisting of twelve distinct somites, of which the posterior five are narrowed and compressed to form, with the postanal sclerite or vesicle, a distinct tail; postanal sclerite with two poison-glands; a pair of comb-like abdominal appendages .... *SCORPIONES.*

b. Abdomen typically short, usually not 'tailed,' at most the posterior three somites narrowed to form a short movable stalk to support the postanal sclerite; the latter never provided with poison-glands; no comb-like abdominal appendages.

a[1]. Postanal sclerite retained as a single unsegmented piece or in the form of a many-jointed flagellum supported by the posterior three segments of the abdomen, which are narrowed to form a movable stalk .... *UROPYGI.*

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* The subclasses and superordinal groups under which these orders have been rightly arranged are, for the sake of simplicity ignored in this volume.

b^1. Postanal sclerite absent; posterior abdominal somites not narrowed to form a movable stalk or tail.

a^2. A deep constriction separating the cephalothorax and abdomen, these regions united by a narrow waist or pedicel; a pair of breathing-organs, almost invariably in the form of lung-sacs, forming a transverse line with the median generative aperture *; sternal area of cephalothorax large, usually subcircular.

a^3. Appendages of 2nd pair spiny, prehensile and subchelate, unlike the legs; those of 3rd pair (1st pair of legs) very long, antenniform, distally many-jointed; abdomen distinctly segmented, without spinning mamillæ; no poison-gland in mandible ...... *AMBLYPYGI.*

b^3. Appendages of 2nd pair pediform, not prehensile and not subchelate, modified in male as reproductive organ; appendages of 3rd pair like the following pairs and constituting the first pair of walking-legs; abdomen usually unsegmented, always furnished with appendages in the form of spinning mamillæ; poison-gland in mandible .... *ARANEÆ.*

b^2. No deep constriction forming a narrow waist between cephalothorax and abdomen; breathing-organs always in the form of tubular tracheæ, the first pair on the abdomen, never situated in a transverse line with the generative orifice; coxæ of cephalo-thoracic limbs in contact or separated by a forward prolongation of the anterior abdominal sternite bearing the generative orifice.

a^4. Body elongate; abdomen consisting of from 10–12 somites; generative aperture situated well behind the coxæ of the last pair

* Except in the spiders of the genus *Tetragnatha*.

of cephalothoracic limbs; coxæ of posterior four thoracic limbs in contact.

a^5. Carapace distinctly segmented; mandible articulated to the sides of its anterior plate; appendages of 2nd pair leg-like and tactile. Of large size ...... *SOLIFUGÆ.*

b^5. Carapace not segmented, merely transversely grooved; mandibles not articulated to the carapace; appendages of the 2nd pair chelate, like those of the Scorpions. Of small size. *PSEUDO-SCORPIONES.*

b^4. Body short; abdomen either unsegmented or consisting of only five somites; generative aperture thrust forwards between the coxæ of the cephalothoracic limbs.

a^6. Abdomen segmented; mouth-parts not modified to form a suctorial proboscis .... *OPILIONES.*

b^6. Abdomen not segmented; mouth-parts usually modified to form a suctorial proboscis .. *ACARI.*

The present volume deals with the Scorpiones, Uropygi, Amblypygi, Solifugæ, and with the larger or otherwise conspicuous species of Araneæ (Spiders).

The Acari (Mites and Ticks) are not likely to be mistaken for any other order. The Opiliones (Harvest Spiders), sometimes called Phalangidea, are, however, frequently confounded with the true Spiders; and the Pseudoscorpiones (False or Book-Scorpions) are often similarly regarded as diminutive Scorpions. Nevertheless, the key to the orders given above will enable naturalists and collectors to refer any Indian arachnid to its proper systematic position in the Class.

Order SCORPIONES.

Integument horny, smooth or granular, usually scantily clothed in parts with short tactile hairs, which are generally longer on the legs and tail than on the trunk. On the segments of the chelæ the hairs are often long and bristle-like, and emerge from circular integumental pits with a thickened rim. The number and position of these pits, known as *setal*, *setiferous*, or *bristle pores*, are often of systematic importance.

Carapace unsegmented and furnished near its centre with a

pair of median eyes, and on each of its antero-lateral angles with two or three large eyes, and sometimes one or two small eyes as well; the triangular area between the eye-groups is termed the *frontal area* or the *anteocular triangle.* The anterior border of the carapace is often notched in the middle, forming a right and left *frontal lobe.* *Mandibles* chelate, consisting of three segments, the

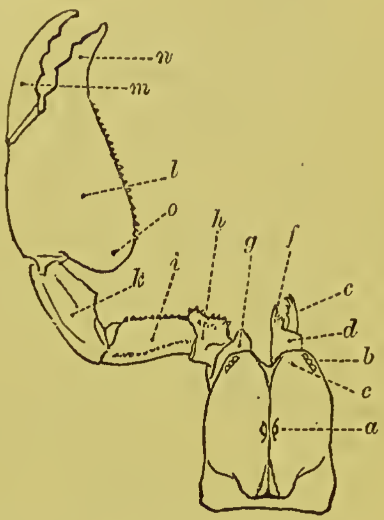

Fig. 1.—Carapace, chela, and mandible of *Palamnæus swammerdami.*

a, median eyes; *b*, lateral eyes; *c*, frontal lobe of carapace; *d*, second segment of mandible; *e*, movable, and *f*, immovable finger of mandible; *g*, coxa; *h*, trochanter; *i*, humerus; *k*, brachium; *l*, hand; *m*, movable finger, *n*, immovable finger of chela; *o*, lobe of hand.

basal small and concealed; the second, larger and swollen, furnished in front with a strong process, the *immovable finger*, which is armed with an upper, and sometimes also with a lower, set of teeth; the third segment, the *movable finger*, which works in a horizontal plane, is also furnished with one or two rows of teeth, an upper and a lower, along its biting-edge.

The appendages of the 2nd pair (*chelæ*) are pincer-like and move for the most part in a horizontal plane; the segments are named as follows from base to tip—*coxa, trochanter, humerus, brachium, hand, movable finger.* The coxa is freely articulated to the membrane on each side of the mouth and acts as a jaw or maxilla; the humerus and brachium are generally furnished with granular *crests* or *keels.* For descriptive purposes the humerus is regarded as set at right angles to the long axis of the body, hence it has an anterior and a posterior surface; whereas the brachium and hand are regarded as resting in a line parallel to the long axis of the body, hence they have an outer and an inner surface. The hand

is very variable in form; the flattish area of it that lies immediately behind the joint of the movable finger, and usually rests upon the ground, is called the *underhand*. This underhand is generally separated externally from the upper side of the hand by a strong crest or keel, the keel of the underhand. The upper side is sometimes evenly convex; sometimes, however, its outer portion above the keel of the underhand is flat and vertical, and its inner portion flat and horizontal, the two areas cutting each other at right angles and separated by a ridge or keel, called the *finger-keel*, because it runs forwards on to the immovable finger. Frequently additional keels are developed both upon the outer and upon the inner portion of the upper surface. The upper surface is generally bordered internally by a sharp edge, known as the inner edge or border, and the area beneath this edge and between it and the underhand is called the inner or inferior surface of the hand,

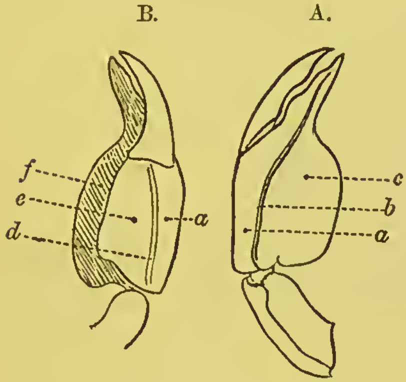

Fig. 2.—A, upper, and B, under side of hand of *Scorpiops crassimanus*.

a, outer portion of upper surface; *b*, finger-keel; *c*, inner portion of upper surface; *d*, keel of underhand; *e*, underhand; *f*, inner surface of hand.

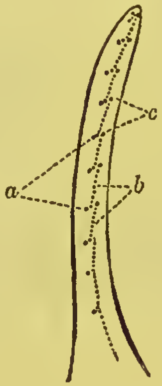

Fig. 3.—Movable finger of chela of *Lychas scutilus*.

a, external; *b*, median; *c*, internal series of teeth.

according to its position when the hand is normally at rest, and according to the shape of the particular hand under description. The movable and immovable fingers are provided with teeth along their biting-edges. The arrangement of these teeth furnishes valuable specific and generic characters. The armature usually consists of several rows of small teeth arranged longitudinally and partly obliquely along the middle line of the finger, sometimes set end to end, sometimes overlapping to a greater or less extent. These constitute the *median series* of teeth. Moreover, the anterior tooth of each row of the median series is often enlarged and separated from the rest of the row to which it belongs. This series of anterior teeth thus enlarged and often isolated constitutes

the *inner series*. An *outer series* similarly results from the enlargement of one or two of the posterior teeth of the median rows.

The four *legs* are practically alike in structure and act as locomotor organs. The coxæ of both 1st and 2nd pairs are furnished with a forwardly-directed *maxillary process*, which underlies the area immediately below the mouth. The coxæ of the 2nd pair

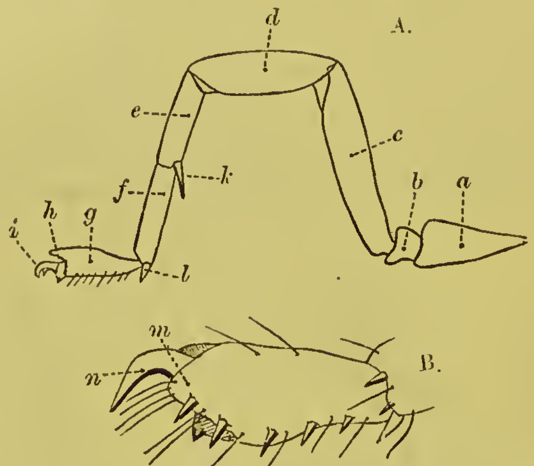

Fig. 4.—A. Diagram of Scorpion's leg. *a*, coxa; *b*, trochanter; *c*, femur; *d*, patella; *e*, tibia; *f*, protarsus; *g*, tarsus; *h*, claw-lobe; *i*, superior claw; *k*, tibial spur; *l*, pedal spur.
B. Side view of posterior tarsus of *Palamnæus swammerdami*. *m*, lateral lobe overlapping base of claw (*n*).

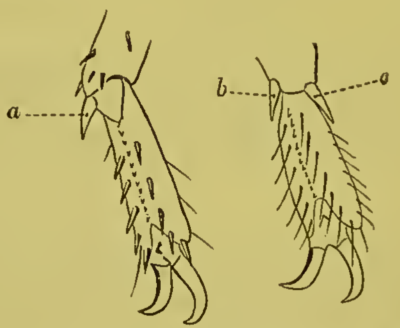

Fig. 5.—A. Lower side of tarsus of *Hemiscorpius*, showing (*a*) single anterior pedal spur; and B, of *Chærilus*, showing (*b*) anterior and (*c*) posterior pedal spur.

meet each other in the middle line. The coxæ of the 3rd and 4th pairs are welded together; they do not meet across the middle line of the body, but are separated from each other by the *sternum* of the cephalothorax, which has the form of a triangular or pentagonal plate, and anteriorly abuts against the coxæ of the legs of the 2nd pair.

None of the seven segments of the legs are subdivided. The seventh or apical segment (*tarsus*) is furnished on its lower side with hairs or spines. Three claws are articulated to the membrane at its distal end, two superior and one inferior, the latter being often partially or wholly worn down. The upper side of the tarsus is generally produced at its distal end into a process (the *claw-lobe*) overhanging the base of the claws, and the claws are sometimes overlapped laterally by a lobate expansion of the side of the tarsus. Attached to the articular membrane which unites the base of the tarsus to the adjacent extremity of the segment that precedes it (the *protarsus*) there are one or two pale but dark-tipped claw-like spurs (the *pedal spurs*)*. In many cases there is a similar spur (the *tibial spur*) between the protarsus and the tibia.

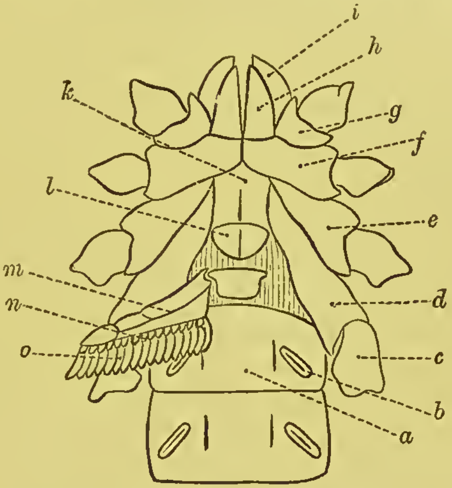

Fig. 6.—Ventral surface of cephalothorax and of anterior end of abdomen of *Palamnæus*.

a, 1st abdominal sternum (=sternum of 3rd abdominal somite) ; *b*, respiratory stigma ; *c*, trochanter of 4th leg ; *d*, coxa of 4th, *e* of 3rd, *f* of 2nd, *g* of 1st leg ; *h*, maxillary lobe of 2nd leg ; *i*, maxillary lobe of 1st leg : *k*, pentagonal cephalothoracic sternum ; *l*, genital operculum ; *m*, segmented shaft of pecten ; *n*, fulcra ; *o*, teeth of pecten.

The *abdomen* is anteriorly as broad as the cephalothorax. It consists of twelve distinct somites, the last five of which are narrow, tubular, flexibly jointed together, and constitute, with the post-anal skeletal piece, the *tail*. This postanal skeletal piece consists of two distinct parts—an enlarged, usually globular basal portion (the *vesicle*), which contains a pair of poison-glands, and a spiniform distal portion (the *aculeus*). Beneath the latter, on the vesicle, there is frequently a tooth-like process, the *vesicular spine*. For purposes of description and measurement, the vesicle and aculeus are regarded as extended in the same straight line as the tail, the

* Those spurs must not be confounded with the thinner blacker spines most frequently seen in their vicinity upon the extremity of the protarsus.

aculeus pointing backward. The *anus* is placed beneath the vesicle, at the end of the 5th tail-segment; the edge of the latter adjacent to the anus is termed the anal border. All the caudal or tail-segments are as a rule carinate, crested or keeled at the sides and below; the keels, when fully developed, being eight or ten in number on the first four segments, whereas the 5th has only five complete keels, one of which occupies the middle line of its lower side. From above downward on each side the keels of the first four segments bear the following names—superior, superior lateral, median lateral, inferior lateral, inferior median. The keels of the 5th caudal segment are named superior lateral, inferior lateral, and inferior median (see fig. 8, p. 17).

Although the tail is in reality part of the *abdomen*, the latter term is, for descriptive purposes, restricted to the seven somites that precede the tail. The last abdominal somite is narrowed posteriorly, and is usually crested both on its tergum and sternum after the manner of the tail-segments, each being furnished with four keels. Each of the four sternal plates that precede the last is provided with a pair of elongate or circular respiratory *stigmata*; on the inner side of the stigma there is a distinct groove, the muscular impression. The sternum of the 2nd abdominal somite is very small, but bears a pair of comb-like appendages (the *pectines*). These consist of a handle or *shaft* and a series of movable *teeth*. Between the bases of the teeth there are small rounded skeletal pieces called the *fulcra*. The shaft is usually segmented. Between the sternum that bears the pectines and that of the cephalothorax, already described, is situated the generative orifice: this is covered by a single or double movable lid, the *genital operculum*.

Measurements.—In the specific descriptions the measurements are taken as follows:—Total length is taken from the anterior border of the carapace, not including mandibles, to the tip of the aculeus when the vesicle is depressed so as to lie in the same line as the caudal segments; the carapace is measured from the side of its anterior border to a corresponding spot on the posterior border, and not along the middle line. The tail-segments are measured laterally along the carinate portion, the measurements not including the short unkeeled cylindrical portion situated at the anterior extremity of the segments, and frequently covered by the posterior extremity of the segment in front. Humerus and brachium of chela are measured along the upper surface; the underhand along the keel that borders it above or externally, and the movable digit along its outer edge.

Sexual differences.—The male is, as a rule, a little smaller than the female and has a narrower abdomen. Moreover the chelæ are frequently longer and the hand is either broader or narrower: when broader, the fingers are, as a rule, separated at the base, the movable being furnished with a lobe-like tooth which fits into a corresponding notch on the immovable. The tail is generally longer, sometimes very much longer, less commonly stouter at its posterior end; the vesicle may be longer and thinner, or more globular or otherwise modified. The pectinal teeth are either

larger or more numerous, sometimes both. Lastly, the genital operculum is always formed of two movable halves, whereas in the female the two halves are frequently united.

The young are born alive.

Distribution. Scorpions are found almost all over the world to the south of a line represented roughly by the 40th or 45th parallels of North latitude. None, however, occur in New Zealand or in Oceanic islands, unless artificially introduced, or in the extreme south of South America. They are strictly carnivorous, feeding for the most part on insects, and live under stones, fallen tree-trunks, the bark of dead trees, in deep burrows that they dig in the soil, or in shallow depressions excavated in the loose sand.

The Scorpions of British India are referable to five families, the characters of which may be tabulated as follows :—

a. Legs furnished with a pair of pedal spurs, one in front and one behind.
- a^1. Sternum almost invariably triangular, narrowed in front; 3rd and 4th legs usually furnished with tibial spurs .... **Buthidæ.**
- b^1. Sternum pentagonal, parallel-sided, tibial spurs never present.
  - a^2. Maxillary process of 1st leg anteriorly expanded, with broadly truncate border; two lateral eyes on each side ; stigmata circular; shaft of pecten scarcely segmented .... **Chærilidæ.**
  - b^2. Maxillary process of 1st leg anteriorly narrowed, apically pointed ; three lateral eyes on each side; stigmata narrow, elongate; shaft of pecten distinctly segmented ...... **Vejovidæ.**

b. Legs furnished with a single anterior pedal spur, the posterior always absent ; sternum pentagonal.
- a^3. Distal lateral edges of tarsi not produced into a lobate prominence overlapping the base of the claw, but straight and forming a right angle with the claw-lobe; body and chelæ flat; hand with strong finger-keel; tail weak, compressed .... **Ischnuridæ.**
- b^3. Distal lateral edges of tarsi produced into a rounded lobe overlapping base of claws and forming a very acute angle with the base of the claw-lobe; body and chelæ not flat; hand without strong finger-keel; tail strong, not compressed .... **Scorpionidæ.**

NOTE.—The following species, belonging to the family Chaetidæ, which, with the exception of the Mediterranean genus *Scorpius* (=*Euscorpius*, Thor.), is confined to Central and South America, were originally recorded from India, but certainly erroneously :—

Chactas quinque-dentatus, Karsch, Zeits. Naturw. liii, p. 405, 1880.
Chactas schaumii, id. ibid. p. 406.

The generic position and specific validity of the first-named is still a matter of doubt. The second, however, which is possibly identical with it, is, according to Kraepelin, specifically the same as a species from British Guiana which I described in 1893 as *Hadrurochactas sclateri*.

Family BUTHIDÆ.

Cephalothoracic sternum small, nearly always narrowed in front to a point, and hence triangular in shape. In two of the genera that occur in India, namely, *Butheolus* and, more especially, *Charmus*, it is more parallel-sided and pentagonal in form, as in the rest of the families of Scorpions; but the true position of these genera in the Buthidæ is shown by the sum total of their characters, more especially by the presence on the legs of the 3rd and 4th pairs of the tibial spurs, which are never found outside the limits of the Buthidæ. Legs with a pair of pedal spurs, of which the anterior is often double, being furnished with a secondary branch. Very frequently a spine beneath the aculeus on the caudal vesicle.

Distribution. Temperate and tropical regions of the world south of the 45th parallel of North latitude.

The Indian genera may be arranged under two subfamilies:—

a. 3rd and 4th legs furnished with tibial spurs .... *Buthinæ*, p. 12.
b. 3rd and 4th legs without tibial spurs .... *Centrurinæ*, p. 42.

Subfamily BUTHINÆ.

Buthini (sensu stricto), *Pocock*, *A. M. N. H.* (6) xvii, p. 428, 1896; *Kraep. Tierr.*, *Scorp. etc.* p. 6, 1899 (Buthinæ, in part).

Characters as above.

Distribution. Confined to the Old World *.

Synopsis of Indian Genera.

a. A strong triangular spine on the caudal vesicle beneath the aculeus...................... LYCHAS, p. 35.
b. No triangular spine, at most a small tubercle beneath the aculeus on the vesicle.
  *a*¹. Frontal area of carapace sloped downwards from the ocular tubercle to the anterior edge; area of carapace behind the eyes impressed with a strong transverse groove; sternum of cephalothorax much smaller than genital operculum .... BUTHEOLUS, p. 28.
  *b*¹. Frontal area of carapace horizontal; area behind eyes without distinct transverse groove; sternum about as long as genital operculum.

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* I propose to eliminate from this subfamily the isolated Neotropical genus *Ananteris*, which differs strikingly from the rest of the family in the structure of the pectines. The subfamily *Ananterinæ* may be created for its reception.

a^2. Abdominal terga with three crests; all the caudal segments keeled.
  a^3. Immovable finger of mandible with two teeth below; carapace with conspicuous keels; not variegated ...... BUTHUS, p. 13.
  b^3. Immovable finger of mandible with only one tooth below; carapace without keels; variegated yellow and black .... HEMIBUTHUS, p. 34.
b^2. Abdominal terga with only one median keel; tail scarcely keeled.
  a^4. Sternum pentagonal; median rows of teeth on fingers of chelæ scarcely overlapping; trunk and tail thickly granular .... CHARMUS, p. 31.
  b^4. Sternum triangular; median rows of teeth on fingers of chelæ largely overlapping; tail and body smooth, polished, scarcely granular .... STENOCHIRUS, p. 32

Genus BUTHUS, Leach.

Buthus, *Leach, Tr. Linn. Soc.* xi, p. 391, 1815 (and of most subsequent authors except C. Koch).
Androctonus + Liurus + Prionurus, *Hempr. & Ehr. Symb. Phys., Scorpiones*, pp. 3–5, 1829.
Androctonus, *Thorell, A. M. N. H.* (4) xvii, p. 7, 1876; *Kraepelin, Jb. Hamb. wiss. Anst.* viii, p. 173, 1891.
Prionurus, *Peters, MB. Akad. Berlin*, 1861, p. 513; *Pocock, P. Z. S.* 1890, p. 126.

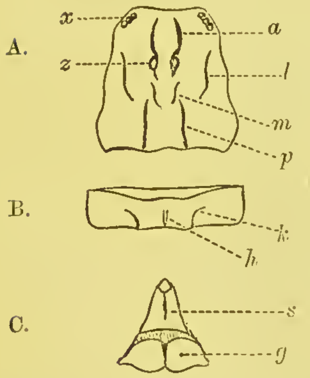


Fig. 7.—A. Diagram of carapace of *Buthus*. *a*, anterior, *m*, median, *p*, posterior, *l*, lateral keel; *x*, lateral, and *z*, median eyes.
B. Abdominal tergum of same. *h*, median, *k*, lateral keel.
C. Triangular sternum (*s*) of cephalothorax, and (*g*) genital operculum of same.

Two teeth on the under edge of the immovable *mandibular finger*. *Terga* with a median and two lateral granular keels. *Carapace* with strong keels (at least in all the Indian species), an anterior pair in front of the ocular tubercle, a shorter median and a longer posterior pair behind it, also a single lateral keel on each side. *Tail* keeled; no spine beneath aculeus. *Sternum* triangular, not shorter than the genital operculum. Armature of *digit of chela* consisting of numerous median rows of teeth, an outer series consisting of couplets of large teeth, and an inner of single teeth, set in advance of those of the outer series.

Type, *B. occitanus*, Amor., S. Europe, &c.

Distribution. Mediterranean area of Palæarctic Region; China; Ethiopian Region down to Zambesi; India, but absent from Ceylon and Burma.

Synopsis of Indian Species.

a. Dorsal surface of 5th segment of tail with compressed, elevated lateral keels; the area between these keels strongly concave ...... *B. australis*, p. 15.

b. Dorsal surface of 5th segment of tail with rounded or at most slightly elevated and granular lateral edges; the area between the edges flat or lightly convex, with a median longitudinal depression.

a[1]. Inferior median keels of 2nd and 3rd caudal segments and the anterior border of lower side of 4th furnished with large paired lobate teeth; anterior terga of abdomen with a transverse granular crest .... *B. doriæ*, p. 16.

b[1]. Inferior median caudal keels evenly or almost evenly granular; anterior terga of abdomen without transverse granular crest.

a[2]. Inferior lateral keels of 5th caudal segment not evenly granular, the granules increasing in size and becoming denticuliform or lobate posteriorly.

a[3]. Median and posterior keels of carapace in contact and forming a pair of converging, nearly continuous ridges; distance between posterior ends of these keels less than distance between posterior margin of carapace and ocular tubercle; hairs on underside of tarsi longer, not spiniform .... *B. macmahoni*, p. 18.

b[3]. Median and posterior keels of carapace forming a pair of irregular interrupted crests; distance between their posterior ends about equal to distance between posterior edge of carapace and ocular tubercle; hairs on underside of tarsi short and spiniform.

a[4]. Intercarinal spaces of tail smooth; granules of inferior keels of 2nd and 3rd caudal segments increasing in size posteriorly; inferior lateral keels of 5th more strongly lobate .. *B. caucasius*, p. 19.

b[4]. Intercarinal spaces of tail finely granular; granules of inferior median keels of 2nd and 3rd caudal segments not increasing posteriorly; inferior keels of 5th caudal segment less strongly lobate .... *B. atrostriatus*, p. 20.

b[2]. Inferior lateral keels of 5th caudal segment evenly and finely granular throughout.

a[5]. Hand granular and furnished with finely granular keels; abdominal sterna finely and closely granular; median and posterior keels of carapace forming an unbroken line.................. *B. acute-carinatus*, [p. 20.

b^5. Hand smooth, not granular; sterna, except the last, smooth; median and posterior keels of carapace not forming a continuous unbroken crest.

a^6. Brachium of chela with two distinct keels on the upper side.

a^7. Carapace and terga, except the last, blackish green; posterior end of tail not darker than the rest; hands yellow .... *B. alticola*, p. 21.

b^7. Median portion of terga and carapace blackish green, lateral portions yellow; posterior end of tail deep brown, much darker than anterior portion; hands and fingers, excepting their tips, black. *B. nigrifrons*, p. 22.

b^6. Brachium not crested above, or furnished merely with a weak crest in front.

a^8. Tail thinner, 2nd and 3rd segments usually distinctly longer than wide; total length of adult from about 65 to over 80 mm.; pectinal teeth from as low as 28 (♀) up to 39 (♂).................... *B. tamulus*, p. 23

b^8. Tail thicker, 2nd segment as broad or broader than long, 3rd almost as broad or broader than long: total length of adult less than 60 mm., average about 50; pectinal teeth from 18 (♀) up to 29 (♂).

a^9. Tail thinner; movable finger longer, as long as carapace, furnished with 14–15 rows of teeth as in *tamulus*; pectinal teeth 23–24 (♀), 24–26 (♂) ...... *B. hendersoni*, p. 26.

b^9. Tail thicker; movable finger shorter, with 12 rows of teeth; pectinal teeth 18–24.

a^{10}. Colour yellowish brown to blackish on body; legs, chelæ, and tail never dark .... *B. rugiscutis*, p. 26.

b^{10}. Colour black, blackish green, or very deep brown on body and limbs................ *B. pachyurus*, p. 27.

1. **Buthus australis**, *Linn. Syst. Nat.* ed. x, i, p. 625, 1758 (Scorpio); *Lönnberg, A. M. N. H.* (7) i, pp. 87–88 (Androctonus): priamus, *C. Koch, Arachn.* v, p. 45, 1839 (Androctonus): hector, *id. ibid.* vi, p. 6, 1839 (Androctonus): australis priamus, *Pocock, Journ. Linn. Soc., Zool.* xxv, p. 305, 1895 (Prionurus); *Kraep. Tierr., Scorp. etc.* p. 15, 1899 (Buthus).

Loc. Algeria and Tunisia (of typical form); Egypt; Syria.

Subspecies **finitimus**, *Pocock, Jour. Bom. N. H. Soc.* xi, p. 103, 1897 (Prionurus); *Kraep. Tierr., Scorp. etc.* p. 16, 1899 (Buthus).

Colour a tolerably uniform yellow, the legs and chelæ clearer than the trunk; tail with its 5th segment and vesicle pale greenish or brownish black, the dark pigment spreading on to the sides and lower surface of the 4th. *Carapace* coarsely granular, the area between the anterior and posterior keels smoother than the sides; anterior keels and superciliary crests granular, posterior keels running in the same direction as the median keels but not quite meeting them. *Terga* coarsely granular; lateral keels obsolete on the anterior segments. *Sterna* weakly granular laterally, the last with four granular crests. *Tail* powerful, with strongly elevated dorsal keels, increasing in width to the middle of the 3rd segment (which is as wide as long), the 4th either slightly narrower than the 3rd (♀) or equalling it in width (♂); normal keels well developed and granular, the superior keels of segments 1–4 ending in a dentiform tubercle; median lateral keel represented by only a few granules on the 2nd segment; inferior and lateral inter-carinal spaces finely but not closely granular; 5th segment with superior keels high and compressed, granules of inferior lateral keels becoming gradually dentiform posteriorly; *vesicle* small, granular. *Chelæ* with granular crests and granular intercarinal spaces on humerus and brachium; hand smooth, its width in adult equal to length of underhand, which is about half the length of the movable digit; the latter basally lobate, about as long as the carapace and furnished with 13 rows of teeth. *Legs* distally hairy; lower side of tarsi naked or furnished with a single row of bristles. *Pectinal teeth* (♀) about 23, (♂) about 30. Length up to 80 mm.

Loc. Sind: Hyderabad, Kotri, Kashmor Bund, and the Kelat frontier (*Ryan, Kemball, Corbett, Dewan Kaseram*).

Subspecies **baluchicus**, nov.

Closely resembling the preceding in colour and structure, but with much more black round the ocular tubercle and in the middle of the depression behind it; the anterior surface, too, of the brachium is infuscate above, and the superior crest of the anterior surface of the humerus also; the extremity of the femur of the legs and the front of the patella usually lightly infuscate.

Loc. Northern Baluchistan (*Maynard & MacMahon*).

2. **Buthus doriæ**, *Thorell, Atti Soc. Ital.* xix, p. 107, 1877; *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 57, 1891; *Pocock, Jour. Bom. N. H. Soc.* xi, p. 104, 1897; *Kraep. Tierr., Scorp. etc.* p. 27, 1899.

Loc. Persia: Teheran.

Subspecies **odonturus**, *Pocock, Jour. Bom. N. H. Soc.* xi, 1897, p. 104; *Kraep. Tierr., Scorp. etc.* p. 27, 1899 (Buthus).

Colour: carapace yellow, with anterior border and ocular tubercle

black, and sometimes the area both behind and in front of the tubercle infuscate; dorsal area of abdomen yellow or lightly infuscate, with clear posterior border; tail entirely clear yellow; chelæ and legs either entirely clear yellow or slightly infuscate in parts. (♀) *Carapace* as long as the 1st and half the 2nd caudal segments or as the 5th; anterior keels granular, abbreviated in front; ocular tubercle very wide; the superciliary crests granular and continued behind the eyes by a pair of converging series of granules; posterior keels granular, very widely separated, their

A.

B.

C.

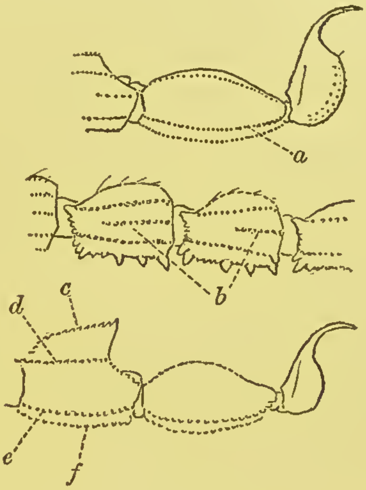


Fig. 8.—A. Vesicle, 5th caudal segment, and part of the 4th caudal segment of *Buthus tamulus*.
B. 2nd and 3rd with part of 1st and 4th caudal segments of *Buthus doriæ*, subsp. *odonturus*.
C. 4th and 5th caudal segments and vesicle of *Buthus australis*, subsp. *finitimus*.
(Anterior to the left, posterior to the right.)
a, inferior lateral keel of 5th segment; *b*, median lateral of 2nd and 3rd segments; *c*, superior; *d*, superior lateral; *e*, inferior lateral; *f*, inferior median.

anterior extremities turned externally in the direction of the lateral keels; intercarinal spaces weakly and sparsely granular. *Terga* weakly granular mesially, more strongly and closely at the sides; the three keels distinct and granular, the laterals diverging and on the anterior terga passing in front into a curved transverse crest; external keel on the 7th tergum weak and not united to the internal. *Sterna* smooth, the last with four subequal granular keels. *Tail* (fig. 8 B) about five times as long as the carapace, 1st segment wider than long, 4th less than twice as long as wide, 1st and 2nd segments with 10 keels; median lateral keel weak on 3rd, absent on 4th, inferior median keels weak and posteriorly abbreviated on 4th; inferior median keels of 2nd furnished with

about 6 dentiform tubercles, of which the posterior three are large and triangular, but unequal in size, becoming progressively longer towards the posterior end of the segment; lower surface of 3rd segment also furnished with 6 large dentiform tubercles on its median keels, and a transverse row of 6 becoming smaller externally on its anterior edge; anterior edge of lower side of 4th also furnished with a transverse row of 6 similar but rather smaller tubercles; granules of inferior lateral crests of 2nd and 3rd segments increasing in size and becoming tuberculiform posteriorly; inferior lateral crests of 5th segment strongly tuberculate, three of the tubercles being especially large and dentiform and close together, anal rim of this segment elevated and lobate, the upper lateral lobe large and bifid; upper surface of tail smooth, lower surface of 1st, 2nd, and 3rd segments smooth, lower and lateral surface of 4th granular. *Chelæ* with humerus and brachium granularly crested, elsewhere smooth; hand smooth, about as wide as brachium; underhand considerably excelling the width of hand, and less than half the movable digit; digits not lobate, rather strongly curved, furnished with 12 rows of teeth. *Legs* with granularly crested femora; distal segments of 1st, 2nd, and 3rd legs thickly hairy; lower side of tarsi sparsely hairy. *Pectinal teeth* 19.

♂. Differing from the ♀ in having the tail longer and thinner, being about six times the length of the carapace, which is shorter than its 5th segment and only as long as the 1st and $\frac{1}{4}$ of the 2nd; 1st caudal segment longer than wide, 4th twice as long as wide. Coxæ of cephalothorax and abdominal sterna finely and closely granular, the 4th and 5th sterna furnished with four finely-granular keels; the tuberculiform teeth on the tail are the same in number as in the female, but are smaller and more widely separated, and the upper lobe of the anal border of the 5th segment is more deeply bifid. Pectinal teeth 28–29.

Measurements in mm.—♂. Total length 58, carapace 6, tail 37, movable digit 8.

Loc. Sind: Kelat Frontier (*Kemball*); Karáchi; Ormára, on the Mekran coast, 130 miles west of Karáchi (*Townsend*).

The typical form of this species occurs in Persia at Teheran. The female only is known. *B. odonturus* was based upon a male; but the subsequent discovery of the female at Karáchi shows that the differences between *B. odonturus* and *B. doriæ* should probably be regarded merely as of subspecific importance. In *B. doriæ* the inferior surface of the 4th caudal segment has four large and two much smaller teeth on its anterior border, is much less granular, with more complete median keels; on the 5th segment the infero-lateral teeth are more widely separated and less acute, and the upper half of the anal lobe is undivided.

3. **Buthus macmahoni**, sp. n.

Colour yellow, keels of carapace and of upper side of humerus black, those of terga slightly darkened; inferior keels of 2nd–4th caudal segments and the three inferior crests of the 5th black.

Carapace with anterior border scarcely emarginate, the intercarinal spaces finely granular; anterior crests complete and granular, superciliary ridges granular, some coarse granules between the lateral eyes and the ends of the anterior crests; posterior and median crests in contact, forming a pair of slightly converging, nearly continuous ridges; distance between the posterior ends of these keels less than distance between ocular tubercle and posterior border of carapace; carapace about as long as the 5th caudal segment, and as the 1st + ½ the 2nd. *Terga* granular, the crests strong and granular, subequal, and nearly parallel, posteriorly spiniform. *Sterna* almost smooth, the last with four finely-granular crests. *Tail* slender, about five times as long as the carapace; 1st segment longer than wide, 4th twice as long as wide; the intercarinal spaces scarcely granular; keels evenly granular, except the inferior lateral of the 5th, which posteriorly becomes gradually but not strongly dentate; median lateral keel traceable, but anteriorly incomplete on 2nd segment; *vesicle* weakly granular, about as wide as high, narrower than the 5th caudal segment. *Chelæ* with upper side of brachium smooth, scarcely crested except for the anterior granular crest; hand smooth, not crested, about as wide as the brachium, about two-thirds the length of the underhand, which is about half the length of the movable digit; movable digit longer than carapace, weakly lobate at base, furnished with 11 rows of teeth. *Legs* with hairs on the underside of the tarsi. *Pectinal teeth* 17–19 (♀), 20–21 (♂).

Measurements in mm.—Total length 46, carapace 5·2, tail 27, movable digit 58.

Loc. Northern Baluchistan (*Maynard & MacMahon*).

Allied to *B. parthorum*, Poc., from Northern Afghanistan, but much smaller, tail thinner, &c.

4. **Buthus caucasius**, *Fischer, Zoogn.* i, p. 401, pl. iv, fig. 1, 1813 (Scorpio): eupeus, *C. Koch, Arachn.* v, p. 127, fig. 419, 1839 (Androctonus); *Birula, Ann. Mus. St. Pétersb.* i, p. 238, 1896; *Kraep. Tierr., Scorp. etc.* p. 23, 1899 (Buthus): ornatus, *Nordman in Démidoff, Voy. Russie*, iii, p. 732, *Arachn.* i, fig. 2, 1840 (Androctonus).

Subspecies **persicus**, *Pocock, Journ. Linn. Soc., Zool.* xxvii, p. 404, 1899.

Resembling the following species, *B. atrostriatus*, in colour and most structural features, but with the intercarinal spaces of the carapace and tail smooth, the sides of the terga only granular, the median intercarinal spaces being smooth, the inferior median keels of the 2nd and 3rd caudal segments with the granules posteriorly increasing in size, the tubercles on the inferior lateral keels of the 5th caudal segment much larger, and the tubercles on the lower surface of the segment between the keels also much coarser; intercarinal spaces of humerus and brachium also smooth. *Pectinal teeth* 18–21.

Measurements in mm.—Total length 51, carapace 5·5, tail 30, back of hand 4, movable digit 5·5, width of hand 3.

Loc. Northern Baluchistan (*Maynard & MacMahon*).

Originally recorded from Seir on Lake Urmi in Persia (*R. T. Günther*).

5. **Buthus atrostriatus**, *Pocock, Jour. Bom. N. H. Soc.* xi, p. 105, 1897.

♀. *Colour* yellow, variegated with black bands and spots; carapace with the anterior border, ocular tubercle, and keels black; keels of terga black, usually an additional black spot on each side; keels on lower side of tail irregularly fuscous, the dark pigment spreading on to the sides of the 4th and 5th segments; vesicle lightly infuscate at the sides; chelæ yellow, the upper and posterior sides of brachium and of hand irregularly lined with fuscous, patches of the same colour being also present upon the upper side of the trochanter and humerus and upon the femora and tibiæ of the legs. *Carapace* granular, with the anterior keels complete and granular, the area on each side between them and the lateral eyes more coarsely granular; median and posterior keels forming an irregular series, distance between their posterior ends about equal to that between ocular tubercle and posterior border of carapace. *Terga* granular throughout, crests granular and parallel. *Sterna* smooth, the last granular at the sides and marked with four finely granular crests. *Tail* of medium thickness, about five times the length of the carapace; 1st segment wider than long, 4th one-third longer than wide; the keels well developed and granular; median lateral crest almost absent on the 3rd segment, occupying the posterior half of the area on the 2nd; intercarinal spaces of the sides and lower surface of tail finely granular; inferior lateral keels of the 5th segment furnished posteriorly with small lobate or dentiform tubercles; anal lobe quadrituberculate; *vesicle* subglobular and granular. *Chelæ* with normal granular keels and finely granular intercarinal spaces; hand smooth, punctured, hairy, considerably wider than brachium; movable digit about one-third longer than underhand; both digits lobate, furnished with 11 rows of teeth. *Legs* granular and granularly crested; tarsi furnished with two rows of setiform spines. *Pectinal teeth* 18–20.

♂. Smaller than ♀; digits more strongly lobate; tail five and a half times as long as the carapace. Pectinal teeth 22–26.

Measurements in mm.—♀. Total length 48, carapace 5, tail 27.

Loc. Kashmor Bund in Upper Sind (*Kemball, Dewan Kaseram*).

6. **Buthus acute-carinatus**, *Simon, Ann. Mus. Genova,* xviii, p. 245, pl. viii, fig. 18, 1883; *Thorell, Bull. Soc. ent. Ital.* xxv, p. 364, 1894; *Pocock, Jour. Linn. Soc., Zool.* xxv, p. 292, 1895; *Kraep. Tierr., Scorp. etc.* p. 18, 1899.

Subspecies **rugosulus**, nov.

Colour a uniform ochre-yellow throughout; keels of the body sometimes darker. *Carapace* as long as the 5th or as the 1st and

half the 2nd caudal segment; entirely covered with fine close granulation; anterior crests complete and granular; posterior crests joining the median crests and forming almost a straight line with them, posteriorly spiniform. *Terga* closely granular throughout; keels long, granular, subparallel, and posteriorly spiniform. *Sterna* and *coxæ* closely granular, the last sternum with four long granular keels, the 4th also subcarinate. *Tail* about five times as long as the carapace, 1st segment scarcely longer than wide, 4th not twice as long as wide; finely granular throughout; keels complete, evenly granular, inferior lateral of 5th evenly granular to posterior end, and passing without interruption into anal lobe; median lateral keel traceable on the 4th segment, strong on 2nd; *vesicle* coarsely granular, subangulate near base of aculeus, about as high as wide. *Chelæ* closely granular throughout; brachium granularly crested above; hand with distinct granular crests above and externally, slightly wider than the brachium; underhand barely half the length of the movable digit, which is basally sublobate (more strongly so in ♂) and furnished with 11 rows of teeth. *Legs* with femora and patellæ closely granular and granularly crested; tarsi armed beneath with short bristles. *Pectinal teeth* 15–17 (♀ ♂).

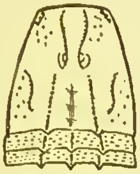


Fig. 9.—Carapace and anterior abdominal terga of *Buthus acutecarinatus.*

Measurements in mm.—Total length 50, carapace 5·5, tail 27, movable digit 6, back of hand 3·2, width of hand 2·2, of brachium 2.

Loc. Hyderabad in Sind (*Ryan*); Gwalior in Central India (type),

Differs from the typical Arabian form in having the 5th caudal segment entirely pale yellow and the hand larger.

7. **Buthus alticola**, *Pocock, Jour. Linn. Soc., Zool.* xxv, p. 302, pl. ix, fig. 3, 1895; *Birula, Ann. Mus. St. Pétersb.* ii, p. 377, 1897; *Kraep. Tierr., Scorp. etc.* p. 21, 1899.

♂. *Colour*: Carapace and anterior six terga blackish green; 7th tergum, tail, legs, and chelæ flavous, with the exception of the digits which are brown with clear yellow tips, and the lower side of the tail which is subolivaceous. *Carapace* coarsely granular and carinate, as long as the 4th caudal segment or as the 1st and $\frac{1}{4}$ of the 2nd. *Terga* coarsely granular and strongly carinate, the three keels on all the segments except the 1st strongly dentiform posteriorly; the granules on the sides of the terga subserially arranged. *Sterna* smooth; median crests of the 5th smooth, lateral crests weakly granular. *Tail* long, slender and low, nearly six times as long as the carapace; 4th segment twice as long as wide; median lateral keel complete on segments 1, 2,

and 3, represented by a few granules on the 4th; all the keels granular, the inferior medians on the 1st and 2nd segments almost smooth; intervening spaces of segments weakly granular, granules on the lower surface of 5th forming two subsidiary crests; *vesicle* globular, wider than high, granular below. *Chelæ* (in ♂) long; humerus as long as carapace; brachium three times as long as wide, with two superior crests well developed and granular, upper crest of posterior surface also present; hand long and wide, much wider than brachium, smooth and punctured, its width about two-thirds the length of the underhand, the latter about two-thirds the length of the movable digit; digits separated at the base, lobate and sinuate, furnished with 14–15 rows of teeth. *Legs* with granularly crested femora; tarsi with two rows of black spinules beneath. *Pectinal teeth* 29.

Measurements in mm.—Total length 81, carapace 9, tail 52·5, length of movable digit 12, width of hand 4·8, of brachium 4·5.

Loc. Chitral in the Hindu Kush, 5000 ft. (*Younghusband*).

Subspecies **penjabensis**, *Birula, Ann. Mus. St. Pétersb.* ii, p. 382, 1897; *Kraep. Tierr., Scorp. etc.* p. 21, 1899 (B. alticola penjabensis).

Described as differing from the typical form in having the tail not more than five times as long as the carapace; with the 1st, 2nd, and 3rd segments convex at the sides, the 1st segment by one-half wider than long, the 4th only by half longer than wide; the hand narrower than the brachium, with the underhand scarcely half the length of the movable digit, and the humerus shorter than the carapace. *Pectinal teeth* 24–25.

Measurements in mm.—Total length 86·5, carapace 9.

Loc. Punjab.

The diagnostic characters of this subspecies may prove to have nothing but a sexual significance, the only known example of *B. penjabensis* being a female, and the type of *B. alticola* a male.

8. **Buthus nigrifrons**, sp. n.

♀. *Colour*: anterior portion of carapace and median area of posterior portion blackish, median portion of anterior six terga also blackish, lateral portion of carapace and anterior terga and the whole of the 7th tergum yellowish; caudal segments 1–3 and anterior end of 4th yellow, posterior half of 4th, the whole of the 5th, and the vesicle deep brown; mandibles deep brown; hand and fingers of chelæ, with the exception of the yellow tips of the latter, black; ventral surface and legs entirely yellow. *Carapace* crested as in *B. alticola*, but with the intercarinal spaces almost entirely smooth; longer than the 4th and nearly as long as the 1st and half the 2nd caudal segments. *Terga* with the crests granular but scarcely spiniform posteriorly; area between them smooth; sides of terga sparsely granular; intercarinal spaces of 7th smooth. *Sterna* smooth, the last with four granular crests. *Tail*

thickly hairy, about five and a half times as long as the carapace; 4th segment about twice as long as wide, 1st a little longer than wide; intercarinal spaces smooth except on the lower surface of the 5th; all keels finely granular; inferior lateral on 5th continued up to anal border without interruption and without enlargement of granules; median lateral keel incomplete anteriorly on 2nd, practically absent on 3rd. *Vesicle* about as wide as 5th segment, as high as wide, granular below. *Chelæ* long and slender; upper surface of brachium bounded in front and behind by a granular keel, a weakly granular keel also present upon the upper portion of the posterior surface; hand small, scarcely as wide as brachium, not crested, smooth, punctured; length of underhand much exceeding its width, less than one-third the length of the movable digit, which is very long and slender, not lobate, and furnished with 16–17 rows of teeth. *Tarsi* furnished beneath with two rows of fine spines. *Pectinal teeth* 26.

Measurements in mm.—Total length 58, carapace 6·5, tail 35, back of hand 3, movable finger 11.

Loc. Northern Baluchistan (*Maynard & MacMahon*).

9. **Buthus tamulus**, *Fabr. Ent. Syst. Suppl.* p. 294, 1798 (Scorpio): nigro-lineatus, *Dufour, Mém. prés. Ac. France,* xiv, p. 570, 1856 (Scorpio): martensii, *Pocock, A. M. N. H.* (6) iii. p. 335, 1889; *id. Jour. Bom. N. H. Soc.* vii, p. 303, 1893 (*nec* martensii, *Karsch,* 1879) (Buthus): grammurus, *Thorell, Ann. Mus. Genova,* xxvii, p. 567, 1889; *Kraep. Tierr., Scorp.* p. 20, 1899 (Buthus).

♀. *Colour* variable; upper side of trunk blackish, reddish or yellow, with ocular tubercle and keels on the carapace black, the adjacent areas also sometimes tinted with black, also keels on terga and adjacent tubercles black, the black of the lateral keels often extending forwards and forming a large patch on each side of the fore part of the terga; tail yellow or reddish yellow, the inferior keels and to a less extent the lateral keels black; sterna entirely pale except for the black keels of the last; chelæ and legs entirely yellow, reddish yellow, or partially infuscate; mandible with faint or deep reticulation of pigment and pigmented granular crest above. *Carapace* scarcely as long as 5th caudal segment, finely and closely granular throughout, with more or fewer coarser granules on its sides and many on the anterior portion both between and outside the anterior keels; the keels granular; sides of tubercle just above eyes smooth; posterior keels forming an irregular line with median keels. *Terga* with three keels, the keels smooth or coarsely granular; the laterals curving outward at their distal ends, and dividing to form two smooth or granular irregular transverse crests; the rest of the terga finely or coarsely, closely or rather sparsely granular; the anterior marginal ledge of the terga smooth or finely and closely granular; keels of the last tergum strong and granular. *Sterna* smooth and polished, the last finely granular at the sides, weakly or scarcely granular in the middle; with 4 nearly smooth

or granular keels. *Tail* robust; 1st segment wider than long, 2nd very slightly or scarcely longer than wide, 3rd one-fourth longer than wide, 5th twice as long as wide; intercarinal spaces granular, the upper very sparsely so; keels evenly granular or nearly smooth, the inferior sometimes quite smooth; median lateral keel traceable on the 4th segment; inferior lateral keel of 5th evenly granular throughout and passing without interruption into the anal lobe; *vesicle* large, granular below, as high as wide, a little narrower on the 5th caudal segment, often subgeniculate below the aculeus. *Chelæ*: humerus finely granular above, with granular crests; brachium, hand, and digits rather thickly hairy and without crests, except for one subdenticulate crest on the anterior surface of the brachium; hand narrow, about as wide as brachium; digits long, movable, more than twice as long as the underhand and furnished with 14–15 rows of teeth. *Legs* finely granular; tarsi with two rows of spinules beneath. *Pectinal teeth* from about 28–39.

♂. Differing from ♀ in having the tail longer (that is to say, about six times as long as the carapace), the hand rounded, thick, considerably thicker than the brachium, the length of the underhand about three quarters that of the movable digit, and the digits lobate and separated at the base when closed.

Length of adult from about 65 up to 90 mm.

Distribution. India, from Sind in the North-west and Dehra Dun throughout the whole of Western, Central, and Southern India at least as far south as Madura. Certainly absent from Burma and Ceylon, and apparently also from the Malabar coast below the Western Ghats in Southern India, though occurring below the Ghats in the Southern Konkan. There are no data to show the limits of range of the species in Eastern Bengal. Several subspecies are recognizable.

Subspecies **Buthus tamulus** typicus (= ? *grammurus*).

Southern form: usually pale yellowish red in colour, with the keels of trunk and areas adjacent often infuscate; frequently the median area of the terga is as a whole darker than the lateral portion. *Terga* very finely and closely granular, both laterally and mesially, a few coarser granules at the sides, but scarcely any between the keels; keels nearly smooth, running externally into a pair of irregular and obsoletely granular, sometimes nearly smooth crests; keels of last abdominal sternum and of lower side of anterior caudal segments weakly granular. *Pectinal teeth* 28–30 (♀), 30–34 (♂). Length up to about 80 mm.

Distribution. Southern India: Satára (*Doria*); Kolhápur State (*Wray*), and Belgaum above Ghats; Dowlaishweram on the Godávari (*Wybrow*); Secunderabad (*Roberts, Ricardo*); Madras (*Henderson, Thurston*); Nellore, Tanjore, Trichinopoly (*Popert*); Madura.

Fabricius cites merely "East Indies" as the locality for *B. tamulus*. I have here restricted the term *tamulus* to the southern

form of the species, because its name appears to have been derived from the Tamil race of South India, and Fabricius is known to have received specimens of other Arthropods, e. g. *Polydesmus stigma* and *Heteropoda regia*, from Tranquebar on the Coromandel coast.

Subspecies **concanensis**, nov.

Darker in colour and smoother than typical form. Upper side of trunk greenish or reddish brown, approaching black, paler at the sides. Legs, chelæ, and tail, with the exception of the inferior keels, flavous or reddish yellow. *Terga* finely granular at sides, anterior marginal ledge smooth throughout; keels quite smooth, shining, the laterals passing externally into a pair of irregular smooth crests resembling a dried stream of tar; inferior keels of last abdominal sternum smooth, also of 1st and 2nd and sometimes also of 3rd caudal segment; all the caudal keels and intercarinal spaces of tail less granular than in typical form. *Pectinal teeth* 29–32 in ♀, 30–35 in ♂. Length up to 91 mm. ♀; 77 mm. ♂.

Loc. Ratnágiri in the South Konkan (*Drew*).

Subspecies **sindicus**, nov.

Paler yellow than the average *B. tamulus* typicus, the keels of the abdomen, carapace, and underside of tail blackish; an indistinct dark spot on each side of the terga in front of the lateral keel. *Terga* much more coarsely granular than in the typical form, the keels distinctly granular, the laterals breaking up anteriorly in coarse granules, which become lost amongst the general coarse granulation of the dorsal surface. *Pectinal teeth* more numerous than in the typical form: 31–34 in ♀; 34–39 in ♂. Length up to 93 mm. ♀; rather smaller in ♂.

Loc. Valley of Lower Indus: Kelat frontier in Upper Sind (*Kemball*); Hyderabad and Kotri (*Ryan*); Sujáwal and Játi in the Karáchi district (*Kemball*).

Subspecies **gujaratensis**, nov.

Replacing *B. sindicus* to the south. Coarsely granular as in that subspecies and in *B. gangeticus*, darker in colour than the former, the trunk being often nearly black; tail thinner and less thickly hairy than in *B. gangeticus*. *Pectinal teeth* fewer in number than in *B. sindicus*: 27–33 in ♀; 31–36 in ♂.

Distribution. Karaghora in Kattywar (*Bulkley*); Pánch Máháls in North Guzerat (*Wallinger*), thence spreading south-eastwards as far as Khandes (*Madan*).

Subspecies **gangeticus**, nov.

Represented by both dark and light forms; the former deep reddish brown with black keels; the hand and brachium of chela and also femora and patellæ of legs partially infuscate; paler form coloured like *B. tamulus* typicus. *Terga* coarsely and closely

granular throughout, the anterior marginal ledge closely granular, except in the middle; keels coarsely granular, the laterals breaking up into granules which become lost in the general granulation of the plate. *Tail* and its crests coarsely granular and thickly hairy, the segments broader and with sides more convex than in the other subspecies. *Pectinal teeth* 26–32 ♀; 31–36 ♂. Length up to about 90 mm.

Distribution. The area drained by the Upper Ganges and its tributaries; Dehra Dun (type, *Gleadow*); Bareilly (*Cambridge*); Allahabad (*Oates*); Gwalior; also Bhopal and Satna in Central India (*Dane*).

10. **Buthus hendersoni**, sp. n.

♀. Nearly intermediate in characters between *B. tamulus* and *B. rugiscutis.* Resembling the typical form of the latter in size, granulation, etc., but with the tail a little thinner; fingers longer and furnished with a larger number of rows of teeth. Chelæ and legs uniformly yellow; terga infuscate, with paler posterior border; inferior caudal keels black. *Carapace* shorter than 1st and 2nd caudal segments taken together, as long as the 5th. *Tail* with 2nd segment as long as wide, 3rd the merest fraction longer than wide, width of 1st equal to length of 3rd, less than length of 5th; height of 2nd less than its width; 5th not twice as long as broad. *Chela* with rugulose brachium; hand as wide as brachium, its width about three-fourths the length of the underhand, which is half the length of the movable finger; movable finger a little longer than carapace and furnished with 14 rows of teeth as in *B. tamulus.* *Pectinal teeth* ranging from 21–26, usually 24.

♂. With similar sexual characters to those of *B. tamulus*; pectinal teeth ranging from 23–29, usually 24–26.

Total length averaging about 50 mm.; male usually less than 50, large females rarely exceeding 55, in one case up to 59.

Distribution. Madras Presidency; Madras, Yercaud in Shevaroy Hills (*Henderson*), Cuddapah, Trichinopoly, and Tanjore (*Popert*).

Though nearly allied to *B. tamulus*, *B. hendersoni* cannot be regarded as a subspecies or variety of the former, seeing that it co-exists in the same locality, without blending.

11. **Buthus rugiscutis**, *Pocock, Jour. Bom. N. H. Soc.* xi, p. 106, 1897; *Kraep. Tierr., Scorp. etc.* p. 20, 1899.

Allied to the preceding, but smaller, rougher, with thicker tail, fewer pectinal teeth, and fewer rows of teeth on digits.

♀. *Colour* varying from reddish yellow to yellowish brown, the keels of trunk and underside of tail usually black. Upper surface of body entirely covered with coarse granules, amongst which the normal keels stand up as granular ridges; anterior keels of carapace not traceable for more than halfway across the frontal area. *Tail* short, about five times the length of the carapace, thickly and coarsely granular below and at the sides; the inferior intercarinal

spaces of the anterior segments sometimes smooth, especially in male; upper surface also granular, but less so than the sides; the segments wider and higher as compared with their length than in *B. tamulus*; 1st, 2nd, and 3rd segments wider than long, 4th very slightly longer than wide, 5th about one-third longer than wide; width of 1st exceeding length of 3rd and almost equal to that of 4th; 1st, 2nd, and 3rd approximately equal in width; height of 2nd equal to its length (in *B. tamulus* the length of the 2nd far exceeds its height, and the length of the 3rd exceeds the width of the 1st). *Chelæ* with brachium finely granular above; movable finger only about as long as the carapace, less than twice the length of the underhand, furnished with 12 rows of teeth. *Pectinal teeth* 18–21.

♂ with the same sexual features as in *B. tamulus*; pectinal teeth 21–24.

Measurements in mm.—♀. Total length 53, length of carapace 5·5, of tail 27. ♂. Total length 44, carapace 5, tail 25·8.

Loc. Mahableshwar (*Wroughton*) and Satára (*Wilkins*) in the South Deccan.

Subspecies **nigritus**, nov.

Allied to the typical form of *B. rugiscutis*, but with the upper side of the body black; chelæ yellow; upper side of tail yellow, lower side with the keels very strongly infuscate, the black from the inferior median keels spreading over the intermediate area and giving rise to a broad median longitudinal band, which is especially distinct on the 4th segment; legs infuscate, with the tibiæ, protarsi, and tarsi pale; sterna clouded with black. *Pectinal teeth* (♀) 19–20.

Loc. Pánchgani in Satára District, South Deccan (*Phipson*).

12. **Buthus pachyurus**, *Pocock, Jour. Bom. N. H. Soc.* xi, p. 107, 1897; *Kraep. Tierr., Scorp. etc.* p. 20, 1899.

Most nearly allied to *B. rugiscutis*, but recognizable by being of a tolerably uniform black or brownish-black colour; the vesicle, hand and fingers, and extremity of legs inclining to reddish brown. Upper side of body granular, as in *B. rugiscutis*. Tail also as in that species, but distinctly thicker; segments 1, 2, and 3 considerably wider than long; the segments, when viewed from above, much more parallel-sided than in *B. rugiscutis*; the 4th segment is almost a square, its anterior and posterior ends being almost as wide as its middle, whereas in *B. rugiscutis* the sides of this and of the other segments are distinctly convex, the segments being wider in the middle than at the ends. In sexual characters, numbers of pectinal teeth, and of teeth on digits approximately as in *B. rugiscutis*.

Total length up to about 46 mm.

Loc. Mandla and Kamptee in the Central Provinces (*Caccia*); Násik (*Millard*), and Satára (*Wilkins*), in the Bombay Presidency.

Genus BUTHEOLUS, Simon.

Orthodactylus, *Karsch, Berl. ent. Zeits.* xxv, p. 90, 1881; *Kraep. Jb. Hamb. wiss. Anst.* vii, p. 215, 1891 (nom. præocc.).
Butheolus, *Simon, Ann. Mus. Genova*, xviii, p. 248, 1883; *Pocock, P. Z. S.* 1890, p. 121; *Kraep. Tierr., Scorp. etc.* p. 34, 1899.
Orthochirus, *Karsch, Berl. ent. Zeits.* xxxvi, p. 306, 1891.

One or two teeth on the underside of the immovable mandibular finger. *Carapace* without granular keels; its frontal area sloped downwards from the tubercle to the anterior edge; area behind the eyes with deep transverse groove. *Tail* very powerful, generally posteriorly incrassate; the vesicle very small, much narrower than the 1st caudal segment. *Sternum* subpentagonal, wider than long, shorter than the genital operculum. *Chelæ* very slender; armature of fingers consisting of median rows of teeth which do not overlap, an inner series consisting of single teeth, and an outer of teeth arranged in couplets.

Type, *B. thalassinus*, Simon.

Distribution. Eastern Mediterranean area of Palæarctic Region; shores of Red Sea; Sokotra; Western and North-western India.

Synopsis of Indian Species.

a. Tail not uniformly coloured, terga with lateral as well as median crest .... *B. bicolor*, p. 31.
b. Tail uniformly coloured; terga with only a single median crest.
  a'. Tail deep bluish green throughout; trunk usually the same tint as the tail, or, at all events, very deep brown................ *B. melanurus*, p. 28.
  b'. Tail uniformly pale yellow; trunk at most lightly infuscate.
    a². 4th segment of tail granular below, 5th granular below posteriorly, 2nd and 3rd granular and crested laterally (♂) . *B. pallidus*, p. 30.
    b². 4th and 5th caudal segments smooth below; 2nd and 3rd smooth, neither crested nor granular laterally (♂)...... *B. flavescens*, p. 30.

13. **Butheolus melanurus**, *Kessler, Trudni Russkago Ent.* viii, p. 16, 1876 (Androctonus); *Pocock, P. Z. S.* 1890, p. 121; *Kraep. Tierr., Scorp. etc.* p. 35, 1899 (Butheolus); *Birula, Ann. Mus. St. Pétersb.* 1898, p. 281 (Orthocheirus): schneideri, *L. Koch in Schneider, Nat. Beitr. Kaukasus*, p. 61, pl. ii, fig. 4, 1878 (Buthus); *Pocock, Tr. Linn. Soc.* (2) *Zool.* v, p. 117, pl. xiii, fig. 2, 1889 (Orthodactylus); *Kraep. Jb. Hamb. wiss. Anst.* viii, p. 215, 1891 (Orthodactylus).

Colour: trunk and tail varying from blackish or deep reddish brown to deep green; lower side of trunk paler; chelæ and legs flavous, or with humerus and femora black; brachium and patella infuscate, pale flavous distally; hands flavous, infuscate at the base of the fingers; pectines flavous. *Carapace* and *terga* thickly granular, ocular tubercle and area just in front of each median

eye smooth; a single median crest on terga; last tergum strongly keeled, nearly smooth between the keels. *Tail* very thick, posteriorly incrassate, the 4th segment about as wide as long, 3rd wider than long, 1st segment with 10 granular keels, 2nd and 3rd with the superior and 4 inferior keels distinct and granular, the median lateral and superior lateral obsolete; 3rd segment partially pitted; 4th much more distinctly pitted than the 3rd, but less granular and almost keelless, the median lateral keels being complete only in front, the superior keel also traceable; 5th segment with inferior lateral keel complete, but weak in front, the rest of the segment deeply and closely pitted, but scarcely granular; dorsal surface of all the segments weakly granular, of the posterior segments pitted; lateral surface of the 1st, 2nd, and 3rd segments, and in a lesser degree of the 4th granular; inferior surface sparsely granular in the intercarinal spaces; *vesicle* small, piriform, pitted. *Sterna* finely granular, smooth, and polished in the middle of the posterior half, more coarsely granular at the sides; the last with four closely granular crests, the first punctured and bristly in the middle. *Chelæ*: humerus with granular crests; brachium with smooth crests; hand smooth, punctured, narrow, narrower than brachium, underhand about half the length of the movable digit, excelling width of hand; movable finger as long as carapace, furnished with 8–9 rows of teeth, the basal row long; the large teeth arranged in pairs, the inner of each pair being distinctly in front of the outer, which is merely the enlarged posterior tooth of one of the median series. *Legs* with granularly crested coxæ and femora. *Pectinal teeth* about 20.

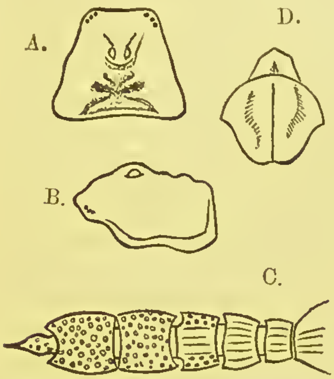


Fig. 10.—*Butheolus melanurus.*

A. Carapace from above. B. Carapace from the side. C. Lower side of tail. D. Sternum and genital operculum.

Distribution. Eastern Mediterranean Region; Punjab.

Two subspecies of this Scorpion are represented in the fauna of British India:—

1. *B. melanurus* typicus; characterized by having the legs and chelæ uniformly clear yellow.

   Loc. Punjab (according to Kraepelin); also occurring in the Transcaspian area and Northern Afghanistan.

2. *B. melanurus*, subspecies *fuscipes*, nov.; characterized by having the humerus and the femora black, and the brachium and patellæ infuscate.

   Loc. Northern Baluchistan (*Maynard & MacMahon*).

14. **Butheolus pallidus,** *Pocock, Jour. Bom. N. H. Soc.* xi, p. 109, 1897 *Kraep. Tierr., Scorp. etc.* p. 36, 1899.

♀. *Colour* entirely yellow throughout, with exception of the eyes which are black. *Carapace* granular throughout except for the ocular tubercle and a ridge on each side of the median frontal depression, which are smooth; groove surrounding ocular tubercle behind not so deep as in *B. melanurus*. *Terga* granular throughout, with a single median keel, the last not smooth on the inner side of the median keels as in *B. melanurus*. *Sterna* and *coxæ* smoother than in *B. melanurus*, the former finely granular both externally and on the inner side of the pulmonary area; the last granular throughout, the granular crests much less distinct than in *B. melanurus*. *Tail* of much the same form as in *B. melanurus*; segments 1–3 carinate as in that species, 4th segment covered with granules below and at the sides, not so conspicuously pitted as in *B. melanurus*; the inferior lateral crests developed, and the inferior medians also traceable; 5th segment covered with granules below, with a median granular keel; lateral keel more irregularly dentate posteriorly than in *B. melanurus*, and more noticeably concave before the anal lobe; *vesicle* larger, aculeus thinner, and pits on vesicle and 5th caudal segment fewer than in *B. melanurus*. *Chelæ* with upper surface of brachium more granular, and movable finger shorter than in *B. melanurus*, the latter being distinctly shorter than the carapace, furnished with 8 rows of teeth, the basal of which is shorter than in *B. melanurus*; the enlarged teeth represented by transverse rows of three each, the inner of these not in advance of the enlarged posterior tooth of the median rows; external to the latter and behind it there is a second tooth, so that the external series consists of two teeth, and not of one as in *B. melanurus*.

♂. Differs from ♀ in having the median keels and adjacent parts of the last abdominal sternum and of the 1st caudal segment smooth, and the lower side of the 4th and 5th segments less granular and scarcely mesially carinate. *Pectinal teeth* 16–17 in ♀, 21–29 in ♂.

Length up to 35 mm.

Loc. Sind; Kashmor Bund and the Kelat Frontier (*Kemball*).

15. **Butheolus flavescens,** *Pocock, Jour. Bom. N. H. Soc.* xi, p. 110, 1897; *Kraep. Tierr., Scorp. etc.* p. 36, 1899.

♂. *Colour* as in *B. pallidus*, but the terga slightly infuscate. Very closely allied to that species in all structural characters, but with the tail less coarsely granular: for example the sides of the 2nd segment just external to the supero-lateral keel are furnished with only a few small granules and a few pits, the corresponding area of the 3rd and 4th is smooth and distinctly pitted, and the lower side of the 4th is furnished with a very few granules. In ♂ of *B. pallidus*, on the contrary, the upper portion of the lateral surface of the 2nd segment is covered with tubercles, of the 3rd it is granular and rugose, and of the 4th distinctly though not

closely granular, and the lower surface of the 4th is somewhat thickly granular both in the middle and at the sides. Moreover in *B. pallidus* the median lateral keel extends as a granular crest at least throughout the posterior half of the 2nd and 3rd segments; in *B. flavescens* it is practically absent on all the segments except the 1st; lastly the vesicle is relatively smaller in *B. flavescens.*

Length 27 mm.

Loc. Karaghora in Kattywar (*Bulkley*).

16. **Butheolus bicolor,** *Pocock, Jour. Bom. N. H. Soc.* xi, p. 108, 1897; *Kraep. Tierr., Scorp. etc.* p. 36, 1899.

Colour: upper side of trunk deep bluish green, sometimes inclining to deep brown; ventral surface yellowish or yellowish green; 4th and 5th segments and vesicle of tail also deep bluish green, but the 1st, 2nd, and usually also the 3rd, yellowish brown, the 3rd sometimes as dark as the 4th, and the 1st and 2nd sometimes very dark brown; legs mostly clear yellow, with greenish femora; humerus and brachium of chela also tinted with greenish black, hand and fingers usually paler. *Carapace* coarsely granular throughout, the ridges over the eyes smooth above, groove defining tubercle behind shallow as in *B. pallidus*. *Terga* coarsely granular throughout, and with the exception of the anterior two distinctly tricostate. *Sterna* smooth in the middle; 5th mostly granular, with a pair of smooth median keels; lateral keels nearly absent. *Tail* much expanded posteriorly; upper surface of all the segments finely granular in the middle, the superior lateral crests present and granular only on the 1st, evanescent on the 2nd; sides of segments 1–3 pitted, these segments with the four inferior keels strong, granular, and the spaces between them granular; 4th and 5th segments smooth, without crests, but coarsely pitted below and at the sides; the inferior lateral keel, however, present and tubercular on the posterior half of the 5th segment; *vesicle* as in *B. melanurus*, but aculeus not so stout at base. *Chelæ* with humerus granular above; brachium smooth with crenulate crests, the anterior of the upper surface sometimes granular: teeth on digit much as in *B. pallidus*. In ♂ the inferior keels of segments 1–3 and the spaces between them are much smoother than in ♀. *Pectinal teeth* 17–19 (♀) 19–21 (♂).

Length up to about 38 mm.

Loc. Western Ghats of India: Kandala Tal and Wai Tal in Satára (*Wilkins*), and Poona (*Wroughton*).

Genus CHARMUS, Karsch.

Charmus, *Karsch, MT. Münch. ent. Ver.* iii, p. 104, 1879; *id. Berl. ent. Zeits.* xxxvi, p. 306, 1891; *Kraep. Tierr., Scorp. etc.* p. 39, 1899.

Heterocharmus, *Pocock, A. M. N. H.* (6) ix, p. 47, 1892.

Carapace without keels; anteocular area horizontal, not sloped as in *Butheolus*. *Terga* with single median keel; no lateral keels.

Sternum small, pentagonal, wider than long, about equal in length to the genital operculum. *Pectines* normal. *Mandible* with movable and immovable finger armed below with two teeth. Finger of *chela* furnished along the middle line with numerous not overlapping rows of teeth; the internal series formed of single larger teeth lying close to the apices of the median rows; external series of small paired teeth. *Tail* weakly keeled, 4th and 5th segments punctured below; no spine beneath aculeus on vesicle.

Type, *C. laneus*, Karsch.

Distribution. Ceylon. One species only known up to the present time.

Presumably on the strength of its pentagonal sternum—a feature which isolates the genus from the rest of the Buthidæ—Karsch referred *Charmus* to the subfamily *Iurini* (= *Vejovidæ*), placing it alongside *Scorpiops* and *Chærilus*. The rest of its organization, however, points unmistakably to its belonging to the Buthidæ.

17. **Charmus laneus**, *Karsch, MT. Münch. ent. Ver.* iii, p. 104, 1879; *Kraepelin, Tierr., Scorp. etc.* p. 39, 1899: cinctipes, *Pocock, A. M. N. H.* (6) ix, p. 47, pl. iii B, figs. 2, 2 *a*, 2 *b*, 1892 (Heterocharmus).

Colour: upper side of trunk blackish, variegated with yellow markings; tail blackish; vesicle ferruginous; chelæ yellowish, brachium marked with a black band, hand blackish; legs blackish, yellowish at the junction of the segments. *Carapace* nearly as long as the 1st and 2nd caudal segments, weakly but closely granular throughout. *Terga* more coarsely granular than the carapace. *Sterna* smooth and shining, the last beset posteriorly with coarse granules. *Tail* with segments 1–3 coarsely and thickly granular below and at the sides, upper surface much more feebly granular, 3rd segment without keels, its margins rounded; 4th and 5th segments without keels, 4th finely granular only in the excavation of the upper side; 5th granular on the posterior portion of its lower and upper surface; anal border granular beneath, lobate at the sides; *vesicle* coarsely punctured; tail and vesicle thickly hairy beneath. *Chelæ* weakly granular and carinate; hand rounded, narrower than brachium, smooth, not crested; fingers long, the movable nearly twice as long as the underhand. *Legs* with weakly granular femora; coxæ smooth. *Pectines* with 14–17 teeth.

Measurements in mm.—Total length 30, carapace 2·5, tail 11·5, 5th segment 3, underhand 1·2, movable finger 2·5.

Loc. Ceylon.

Genus STENOCHIRUS, Karsch.

Stenochirus, *Karsch, Berlin. ent. Zeits.* xxxvi, p. 306, 1891; *Kraepelin, Tierr., Scorp. etc.* p. 39, 1899.

Two teeth on lower side of immovable finger of *mandible*. *Carapace* with frontal area horizontal, almost smooth, not keeled,

at most weakly granular. *Terga* also almost smooth, at most finely granular at the sides and in the dorsal impressions, furnished with a single smooth median keel. Cephalothoracic *sternum* triangular, a little longer than wide, as long as the genital operculum. *Tail* robust, not keeled below; no spine on vesicle beneath aculeus. *Hand* narrow; fingers long, the median rows of teeth overlapping each other by nearly half their length, ending posteriorly in 5 or 6 teeth.

Type, *S. sarasinorum*, Karsch.

Distribution. Malabar coast of India and hills of Ceylon.

Synopsis of Indian Species.

a. Dorsal plates of abdomen finely granular laterally and in the depression on each side of the median keel, the last finely granular posteriorly; humerus granular and weakly crested in front........................ *S. politus*, p. 33.

b. Dorsal plates of abdomen entirely smooth; humerus of chela smooth, rounded in front (according to Kraepelin)................ *S. sarasinorum*, p. 33.

18. **Stenochirus politus**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 262, 1899

Colour a deep shining blackish brown on the tail and the upper side of the body; legs, mandibles, chelæ, and lower side of body a little paler than its upper side, the three distal segments of the legs quite pale; fingers also pale, but brownish at the base. *Carapace* smooth, finely granular in the depression laterally and posteriorly. *Terga* smooth, finely granular at the sides and in the depression on each side of the median keel; last tergal plate closely granular throughout in its posterior half. *Tail* a little more than six times as long as the carapace, and slightly increasing in width posteriorly to the middle of the 4th segment, which is a little longer than broad (3 : 2·5); length of 2nd segment equal to the width of the 4th; the upper side of the segments mesially granular; the rest of the tail smooth and polished above and below, entirely without keels, but distinctly though not coarsely punctured; *vesicle* smooth, punctured; aculeus thick at base. *Chelæ* slender and elongate; humerus weakly crested and weakly granular in front; brachium smooth, without crests or granules; hand also much narrower than brachium; fingers smooth, movable more than twice the length of the underhand, and armed with 10 median rows of teeth. *Pectinal teeth* 15.

Measurements in mm.—Total length 33, carapace 3, tail 20, width of 1st caudal segment 2·3, of 4th 2·6.

Loc. Kanara (*Bell*).

19. **Stenochirus sarasinorum**, *Karsch, Berl. ent. Zeits.* xxxvi, p. 306. pl. xii, fig. 30, 1892; *Kraep. Tierr., Scorp. etc.* p. 39, 1899.

Resembling the preceding in colour, but, judging from Kraepelin's description, differing in having the carapace finely granular only in

the dorsal groove behind the ocular tubercle, and the tergal plates smooth and shining, not granular. Last sternal plate thickly and finely punctured. Also the humerus is smooth and rounded in front, not weakly crested and granular as in *S. politus*. Moreover, judging by the figures published by Karsch, the length of the 2nd caudal segment is much less than the width of the 4th. Length up to about 40 mm.

Loc. Ceylon: Peradeniya (*Sarasin*).

Genus HEMIBUTHUS, nov.

Intermediate in characters between *Buthus* and *Lychas*; resembling the latter in the absence of keels from the carapace and the presence of a single tooth on the under side of the immovable finger of the mandible, and the former in the absence of a spine beneath the aculeus of the caudal vesicle and in that the teeth of the inner row on the fingers of the chelæ alternate with those of the outer row, being situated opposite the middle of the corresponding rows of the median series.

Type, *H. crassimanus*.

Distribution. India.

20. **Hemibuthus crassimanus**, *Pocock, Jour. Bom. N. H. Soc.* xi, p. 110, 1897; *Kraep. Tierr., Scorp. etc.* p. 44, 1899 (Archisometrus).

Colour blackish brown, without distinct yellow pattern; tail paler; vesicle, hands, and distal segments of legs clear yellow. *Carapace* somewhat finely granular, more coarsely so on the anterior border, its posterior border, like those of the anterior terga, tri-emarginate; nearly as long as the 1st and 2nd caudal segments, and slightly longer than the 5th. *Terga* distinctly though not very coarsely granular posteriorly; with conspicuous lateral crests. *Sterna* smooth and punctured, the last almost without crests and granules. *Tail* of medium length and thickness, barely five times as long as the carapace; 1st segment as wide as long, 4th one-fourth longer than wide; intercarinal spaces sparsely granular, punctured, keels strongly granular, median lateral represented on the posterior half of the 2nd and 3rd by a series of granules, weak on the 1st; *vesicle* nearly smooth, only sparsely granular, punctured; angulate beneath the aculeus. *Chelæ* with hand smooth, rounded, large, much wider than brachium; fingers short, the movable about equal to the carapace and to the underhand in length; with 8 rows of teeth. *Pectinal teeth* 12.

♂. With larger hand, and tail posteriorly incrassate; pectinal teeth 14–15.

Measurements in mm.—(♀) Total length 28, carapace 3, tail 14·5, width of hand 2.

Loc. Western India: Pánch Máháls in Guzerat (*Wallinger*).

Genus LYCHAS, C. Koch.

Lychas, *C. Koch, Arachn.* xii, p. 3, 1845 (in part).
Archisometrus, *Kraepelin, Jb. Hamb. wiss. Anst.* viii, p. 217, 1891; *id. Tierr., Scorp. etc.* p. 41, 1899.

Carapace without posterior and lateral keels; anteocular area horizontal. *Terga* with two or three crests. *Tail* carinate; a conspicuous triangular tooth on vesicle beneath the aculeus. *Mandible* with one inferior tooth on the immovable finger. *Chela* with movable finger armed with numerous rows of teeth set end to end, not overlapping; also with an inner set of larger teeth, each set close to the distal end of the rows of the median series, and with an outer set composed of pairs of larger teeth, set close to the posterior ends of the median rows. *Sternum* triangular, longer than wide.

Type, *L. scutilus*, C. Koch.

Distribution. Tropical Africa; India to Australia.

The genus *Lychas* was based upon two species, *L. maculatus* and *L. scutilus*. The first had already been made the type of the genus *Isometrus* by Hemprich and Ehrenberg. Hence *scutilus* becomes the type of *Lychas*.

Synopsis of Indian Species.

a. Abdominal sterna coriaceous, the 4th and 5th granular throughout; pectinal teeth 12; tarsi bearing two rows of bristles beneath . . *L. rugosus*, p. 39.

b. Abdominal sterna, with the exception of the 5th, smooth and polished; pectinal teeth 15–25; tarsi with pad of bristles.

- a^1. Tibial spurs of 3rd and 4th legs very long, much longer than the hairs on the segments.
  - a^2. Carapace evenly granular throughout.
    - a^3. Terga with three distinct keels; underhand nearly as long as the movable finger . . . . *L. tricarinatus* p. 40.
    - b^3. Terga with a single median keel; underhand only about half the length of the movable finger . . . . . . *L. hendersoni*, p. 40.
  - b^2. Frontal area of carapace nearly smooth or studded in front with a few large granules.
    - a^4. Terga with large tubercle on each side, forming a small lateral crest; legs and chelæ uniformly yellow . . . *L. shoplandi*, p. 41.
    - b^4. Terga without trace of lateral crest; legs variegated with black.
      - a^5. Chelæ yellow; tail mostly yellow . *L. lævifrons*, p. 41.
      - b^5. Chelæ with hand entirely black, brachium black above; tail almost wholly black . . . . *L. feæ*, p. 42.

b^1. Tibial spurs of 3rd and 4th legs short, scarcely longer than the hairs of the tibia.
  a^6. Abdominal sterna thickly marbled with black .... *L. nigristernis*, p. 38.
  b^6. Abdominal sterna, with exception of the 5th, uniformly pale yellow.
    a^7. Last abdominal sternum with four granular keels; hand with two granular finger-keels .... *L. scutilus*, p. 37.
    b^7. Last abdominal sternum with only a pair of distinct keels; hand only obsoletely keeled
      a^8. Chelæ and legs uniformly yellowish brown; movable finger much longer than carapace; fingers scarcely sinuate in ♂ .... *L. scaber*, p. 38.
      b^8. Chelæ and legs variegated black and yellow; movable finger only slightly exceeding carapace; fingers strongly sinuate in ♂ .... *L. mucronatus*, p. 36.

21. **Lychas mucronatus**, *Fabr. Ent. Syst. Suppl.* p. 294, 1798 (Scorpio); *Thorell, Ann. Mus. Genova*, xxvii, p. 566, 1889 (Isometrus); *Pocock, in Weber, Reise Niederl. O.-Ind.* iii, p. 85, pl. vi, fig. 1, 1893; *Thorell, Bull. Soc. ent. Ital.* xxv, p. 368, 1894; *Kraep. Tierr., Scorp. etc.* p. 46, 1899 (Archisometrus); *Kraep. Jb. Hamb. wiss. Anst.* viii, p. 223, 1891 (Archisometrus): varius, *C. Koch, Arachn.* xi, p. 29, fig. 864, 1845 (Tityus); *Simon, Ann. Mus. Genova*, xx, p. 362, 1884; *Oates, Jour. Bom. N. H. Soc.* iii, p. 245, 1888 (Isometrus): atomarius, *Oates, Jour. Bom. N. H. Soc.* iii, p. 245, 1888 (? atomarius, *Simon, Ann. Mus. Genov.* xx, p. 363, 1884) (Isometrus).

Colour yellow varied with black; carapace with ocular tubercle and interocular triangle black, the rest of it marked with irregular greyish-black lines; terga black in the middle along the keel, a black patch interrupted by a yellow >-shaped mark on each side, and six yellow spots separated by black spaces; sterna yellow, with a blackish patch on each side; tail darker posteriorly, the lower surface lined with black, the posterior ends of the segments blacker than the anterior; vesicle uniformly deep brown; mandibles black; humerus of chela mottled with black above; brachium mostly black above, yellow at the base; hand yellow, with a few small spots; basal half of fingers black, distal end yellow.

♀. *Carapace* a little shorter than 5th caudal segment, as long as 1st and half the 2nd, granular throughout. *Terga* granular throughout, with single median granular keel. *Sterna* smooth, except the last, which is closely granular and furnished with a pair of median granular keels, the lateral keels obsolete. *Tail* about five times as long as the carapace, finely granular; 2nd segment almost as wide as long, 4th not twice as long as wide: median lateral keel present, but weak on the 2nd segment; *vesicle* granular below: spine beneath aculeus triangular, pointed. *Chelæ* finely granular, with granular crests; hand almost smooth, with obsolete

finger-keel, a little narrower than brachium, width a little less than length of underhand: digits in contact, not sinuate; the movable longer than carapace, at least twice the length of the underhand, armed with 6 rows of teeth, the basal very long, extending over half the length of the finger; the outer row of teeth 9 (8–10) in number; the inner row only 5, situated in the distal half. *Legs* externally granular, with short tibial spurs. *Pectinal teeth* about 21.

♂ with tail a little longer than in ♀ and stouter, the 5th segment and vesicle being scarcely granular and the former not carinate. *Chelæ* with hand much inflated, considerably wider than brachium; the underhand more than half the length of the movable digit, which is slightly sinuate and armed with a large tubercle at the base; immovable finger with its basal half strongly arched, so that when closed at the tip a wide space is left between the basal ends of the two fingers.

Measurements in mm.—♀. Total length 58, carapace 6, tail 32, underhand 3, movable finger 6·5, width of hand 2. ♂. Total length 53, carapace 6, tail 33, underhand 4, movable finger 6·5, width of hand 3.

Distribution. Occurring in abundance in both Upper and Lower Burma and Tenasserim (*Oates & Fea*), thence spreading eastwards into China and Siam, and southwards over the islands of the Indo-Malayan area as far as Flores.

22. **Lychas scutilus**, *C. Koch, Arachn.* xii, p. 3, fig. 962, 1845 (Lychas); *Thorell, Ann. Mus. Genova,* xxvii, p. 525, 1889–1890; *Pocock, Jour. Linn. Soc., Zool.* xxiii, p. 435, 1890 (Isometrus): scutatus, *C. Koch, Arachn.* xii, p. 163 (index), 1845 (Lychas); *Thorell, Bull. Soc. ent. Ital.* xxv, p. 367, 1894; *Kraep. Tierr., Scorp. etc.* p. 44, 1899 (Archisometrus): weberi, *Karsch, Berlin. ent. Zeits.* xxvi, p. 184, 1882 (Isometrus); *Kraep. Jb. Hamb. wiss. Anst.* viii, p. 221, 1891 (Archisometrus): mesor, *Simon, Ann. Mus. Genova,* xx, p. 371, 1884 (Isometrus): phipsoni, *Oates, Jour. Bom. N. H. Soc.* iii, p. 248, figs. 1, 2, 1888 (Isometrus).

♀. *Colour*: trunk much more uniformly fuscous above than in *mucronatus*, the terga, however, marked with a pair of circular yellow spots near the middle, and one on the posterior lateral angles; the last tergum mostly yellow, blackish only in front; anterior four caudal segments yellowish red above, last segment and vesicle blackish; chelæ mostly yellow; the extremity of the brachium, the hand, and the basal half of the fingers blackish; *legs* yellowish, or blackish with yellow tarsi. *Carapace* and *terga* a little more coarsely granular than in *L. mucronatus.* Last *sternum* with 4 granular keels; 3rd with rounded punctured spot in the middle of its hinder portion. *Tail* much longer and thinner, about six times as long as the carapace; 2nd segment more than twice, 4th about three times as long as wide; keels stronger than in *mucronatus*; the inferior lateral edges of the 5th carinate. *Chelæ* with hand granular and distinctly carinate above, but

narrower than in *L. mucronatus*, the width about half the length of the underhand, the latter less than half the movable finger, which is toothed as in *L. mucronatus*. *Tibial spurs* quite short. *Pectinal teeth* 16 and upwards.

♂. With sexual features very different from those of *L. mucronatus*; no yellow spot on 3rd sternum. *Tail* very long and slender, more than nine times as long as the carapace. *Chelæ* also longer than in ♀, but otherwise of the same form. *Pectinal teeth* up to 20.

Measurements in mm.— ♀. Total length 65, carapace 6, tail 37, underhand 3, movable finger 7·8. ♂. Total length 81, carapace 6, tail 57, movable finger 8.

Distribution. Southern Tenasserim (*Oates*), thence throughout the Malay Peninsula into Sumatra, Java, and adjacent islands.

23. **Lychas scaber**, *Pocock, Jour. Bom. N. H. Soc.* vii, p. 300, 1893; *Kraep. Jb. Hamb. wiss. Anst.* xii, p. 86, 1895; *id. Tierr., Scorp. etc.* p. 51, 1899 (Archisometrus).

Colour: carapace yellow; anteocular triangle and lateral margin, as well as ocular tubercle and an obscure stripe on each side, blackish; terga yellowish or brownish, with six yellow spots separated by black intervals on the posterior border; sterna, tail, legs, and palpi yellowish or yellowish brown, scarcely mottled; the tail darker beneath posteriorly, the fingers darker in their basal half. *Carapace* coarsely and evenly granular throughout except on the tubercle, as long as the 1st + ½ the 2nd caudal segments, shorter than the 5th. *Terga* also coarsely and closely granular throughout. *Sterna* smooth, 2nd with median sensory area in ♀; last granular throughout, with 4 granular crests, the external short. *Tail* nearly five times as long as carapace, granular; 1st and 2nd segments with 10 keels. *Chelæ* granular and crested as in *L. mucronatus*; hand weakly keeled, small, narrower than brachium, its width a little more than half the length of the underhand, which is less than half the movable digit, the latter longer than carapace, armed almost as in *L. mucronatus*, with 8 external, 6 internal, and 6 median rows. *Legs* with short spurs. *Pectinal teeth* 17–19 (♀), 19–21 (♂).

♂. Smaller than ♀; tail longer and thinner, about six times as long as the carapace, which is only as long as its 3rd segment, 5th segment practically smooth and keelless; chelæ with hand as wide as brachium, underhand quite half the length of the movable digit; immovable digit slightly sinuate at base, movable not lobate.

Measurements in mm.— ♀. Total length 36, carapace 4·5, tail 22. ♂. Total length 37, carapace 3·5, tail 25.

Loc. S. India: Madras (*Thurston*), Secunderabad (*Ricardo*).

24. **Lychas nigristernis**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 265, 1899 (Archisometrus).

Allied to *L. mucronatus*, *weberi*, and *scaber*.

Colour varied black and yellow: anteocular area of carapace and

mandibles black; tail spotted and lined with black, sterna marbled with black; legs black and yellow; chelæ with humerus black and yellow, brachium entirely black; hand and fingers yellow, with a few spots of black on the outer surface of the hands. *Carapace* and *terga* evenly granular throughout; the latter with a single median crest; *sterna* smooth, the last granular and furnished with four keels. *Tail* about five times as long as the carapace, 1st segment as wide as long, 4th twice as long as wide, intercarinal spaces granular, keels strong and granular; terminal granule of the upper keels of the 3rd and 4th segments, and in a lesser degree of the 1st and 2nd, spiniform but small, median lateral crest absent on the 3rd, weak and anteriorly abbreviated on the 2nd; *vesicle* coarsely granular below. *Chelæ* with hand slender, narrower than brachium; underhand less than half the length of movable finger, which is longer than the carapace and furnished with 6 rows of teeth as in *mucronatus*. *Tibial spurs* short. *Pectinal teeth* 15–16. *Sternum* with shallow indentation along middle line.

Measurements in mm.—Total length 37, carapace 4, tail 21, movable finger 4·3.

Loc. Western Himalaya, Dehra Dun, 8000 ft. (*Gleadow*).

25. **Lychas rugosus**, *Pocock, Jour. Bom. N. H. Soc.* xi, p. 111, 1897; *Kraep. Tierr., Scorp. etc.* p. 48, 1899 (Archisometrus).

Colour black, varied with yellow; frontal region of carapace black; terga with four yellow marginal spots, an anterior median yellow patch, yellow ><-shaped marks, and submarginal yellow band; tail yellow, marked with black lines which posteriorly fuse together; humerus and brachium black, spotted with yellow; hand clear yellow; fingers black with yellowish tips; legs yellow banded with black; sterna pale, the 4th with a few spots on its posterior border, the last indistinctly lined with black. *Carapace* and *terga* much more coarsely granular than in the other species, carapace almost as long as the 1st and 2nd caudal segments, or as the 5th. *Terga* without lateral keels. *Sterna* coriaceous, 3rd and 4th distinctly granular throughout; the last with 4 granular crests. *Tail* short and slender, about four and a half times as long as the carapace: 1st, 2nd, and 3rd segments with median lateral keel complete; the intercarinal spaces granular, the keels strong and granular, the superior subspiniform apically; 1st segment about as wide as long, 4th scarcely twice as long as wide; *vesicle* smooth below. *Chelæ* with hand about as wide as brachium, smooth; movable digit not twice as long as the underhand, shorter than the carapace, armed with 8 rows of teeth, basal row quite short. *Tibial spurs* short. *Pectinal teeth* 12. *Tarsi* with two rows of bristles beneath.

Measurements in mm.—Total length 22, carapace 2·8, tail 12, movable finger 2·5.

Loc. Raipur, Central Provinces (*Phipson*).

26. **Lychas tricarinatus**, *Simon, Ann. Mus. Genova*, xx, p. 371, 1884; *Pocock, Jour. Linn. Soc., Zool.* xxiii, p. 433, 1890 (Isometrus); *Kraep. Jb. Hamb. wiss. Anst.* viii, p. 227, 1891; *Pocock, Jour. Bom. N. H. Soc.* vii, p. 301, 1892; *Kraep. Tierr., Scorp. etc.* p. 50, 1899 (Archisometrus).

Colour variable, sometimes tolerably uniformly brownish yellow throughout, sometimes blackish varied with yellow, but not so strongly as in *L. mucronatus*, no black anteocular triangle as in that species. *Carapace* with its anterior border less emarginate than in *L. mucronatus* and *L. scutilus*. *Terga* 3–6 with distinct though short lateral crests. Last *sternum* with 4 finely granular crests. *Tail* of much the same form as in *L mucronatus*, about five times as long as the carapace; the sides of the segments more convex, the median lateral keel on the 2nd stronger, and a distinct supero-lateral granular keel on the 5th; *vesicle* very small, much smaller than in *L. mucronatus*, but more coarsely and more serially granular below. *Chelæ* with crests on brachium weaker; hand without keels, narrow; fingers very short, movable much shorter than carapace, longer than the underhand by only one-fourth of its length, furnished with 6 rows of teeth, the basal row long, but not half the length of the finger. *Legs* with very long tibial spurs. *Pectinal teeth* 21–25 (♀, ♂).

♂ differs from ♀ in having the *tail* much longer, six or more times the length of the carapace, the width of 1st segment about two-thirds of its length; *carapace* only slightly longer than the 1st caudal segment, and much shorter than the 4th. *Hand* a little wider than the brachium; *fingers* not quite in contact at the base, the movable furnished with a lobe which fits into a sinuation of the immovable.

Measurements in mm. (specimen from Madras).—♀. Total length 57, carapace 6, tail 32, finger 4·5. ♂. Total length 54, carapace 5, tail 35.

Distribution. Central and South India; Bhopal (*Dane*) and Kamptee (*Caccia*), Belgaum, Kanara (*Bell*), Mangalore (*Battie*), and Trivandrum (*Ferguson*), Tanjore and Nellore (*Popert*), Madras (*Henderson*) and Pondicherry; Yercaud in the Shevaroy Hills (*Henderson*), Nilgiri Hills (*Daly*).

Representatives of this species from the lowlands of the Madras Presidency (*i. e.* Madras, Nellore, and Tanjore) are paler in colour than those that are met with in the Deccan, Central India, the Malabar coast, and the hilly areas of the Carnatic.

27. **Lychas hendersoni**, *Pocock, Jour. Bom. N. H. Soc.* xi, p. 111, 1897; *Kraep. Tierr., Scorp. etc.* p. 51, 1899 (Archisometrus).

Allied to *L. tricarinatus* in having the tibial spurs long and the cephalothoracic sternum small and indented throughout its length.

Colour: carapace black and yellow in about equal proportions; two pale spots on the front border as in *L. tricarinatus*; terga with median yellow patch, yellow ><-shaped marking, yellow

spot on each side of middle line, and submarginal yellow stripe; last tergum densely varied with black and yellow; sterna black at the sides, the last black on the keels; tail ornamented with black patches above, below, and at the sides; vesicle lined with black below; chelæ with humerus and brachium black, spotted with yellow; hands and fingers entirely yellow; legs also black, spotted with yellow, yellower distally. *Trunk* and *tail* granular and carinate as in *L. tricarinatus*, but no lateral keels on terga; keels on tail rather stronger, the median lateral on the 3rd being more distinct, the superior lateral on the 1st stronger, with the dorsal area of the segment rising considerably above it; *vesicle* small as in *L. tricarinatus*. *Chelæ* with fingers much longer than in *L. tricarinatus*, the movable more than twice the length of the hand-back, toothed as in *L. tricarinatus*. *Pectinal teeth* 17–18.

Measurements in mm.—Total length 34, carapace 3·5, tail 18·5, movable digit 4.

Loc. S. India: Yercaud in the Shevaroy Hills (*Henderson*).

28. **Lychas shoplandi**, *Oates, Jour. Bom. N. H. Soc.* iii, p. 246, fig. 7, 1888; *Thorell, Ann. Mus. Genova*, xxvii, p. 562, 1889; *Pocock, Jour. Linn. Soc., Zool.* xxiii, p. 434, 1890 (Isometrus); *Kraep. Jb. Hamb. wiss. Anst.* viii, p. 225, 1891; *Pocock, Jour. Bom. N. H. Soc.* vii, p. 303, 1892 (Archisometrus).

Nearly allied to *L. tricarinatus*, but with upper side of trunk either entirely black or with faint yellow marks; legs, chelæ, and upper side of tail reddish yellow; lower side of caudal segments with keels, area between median keels and posterior half of area between median and lateral keels black. Upper side of trunk more coarsely granular than in *L. tricarinatus*; some large granules along the front edge of the carapace and in front of the median eyes; lateral crests on terga represented by one or two larger granules. Terminal granules of superior caudal keels not so large; no distinct supero-lateral granular crest on the 5th segment; vesicle distinctly larger. In the chelæ the hand is more globular and the fingers more curved, the movable being about twice or less than twice the length of the underhand.

Measurements in mm.—Total length 58, carapace 5·8, tail 31, movable finger 5.

Loc. Lower Burma: Palone 53 miles north of Rangoon; Entagaw near Pegu (*Oates*); Prome (*Fea*).

29. **Lychas lævifrons**, *Pocock, Jour. Bom. N. H. Soc.* xi, p. 113, 1897; *Kraep. Tierr., Scorp.* p. 50, 1899 (Archisometrus): shoplandi, *Pocock, Jour. Linn. Soc., Zool.* xxiii, p. 435, 1891; *id. Jour. Bom. N. H. Soc.* vii, p. 301, 1892 (Isometrus) (nec shoplandi, *Oates*).

Nearly allied to *L. shoplandi*, but the legs marbled with black; the terga marked with a yellow median keel, a patch of the same on the postero-lateral angle, and yellow ><-shaped marks. The

frontal area of the carapace is still smoother, the large granules noticeable in *L. shoplandi* being practically absent, the anterior border being polished and glossy; the supero-lateral keel on the 5th caudal segment and that on the upper side of the brachium are stronger and more granular, and the fingers of the hand are longer, the movable being more than twice the length of the underhand, the two together being considerably longer than the 1st, 2nd, and 5th caudal segments. In *L. shoplandi* they are subequal. *Pectinal teeth* 22.

Measurements in mm.—Total length 32, carapace 4, tail 20, movable finger 4.

Loc. Calcutta.

30. **Lychas feæ**, *Thorell, Ann. Mus. Genova,* xxvii, p. 569, 1889 (Isometrus); *Kraep. Tierr., Scorp.* p. 51, 1899 (Archisometrus).

Allied to *L. shoplandi* and *lævifrons,* with long tibial spurs and deeply impressed sternum. *Colour* of carapace and terga black; sterna marginally black, the last almost entirely black, yellowish along the lateral and posterior margin, and marked with a crescentic yellow stripe in front; tail nearly black, the segments yellow in front; vesicle yellow; humerus of chela yellow, with a few small spots at its distal end; brachium yellow, with its upper surface mostly black; hand black all over, fingers yellow, also a black spot on upper side of trochanter of chela; coxa of chela black apically and externally; legs almost entirely black externally. *Carapace* and *terga* granular as in *L. shoplandi*, but no large isolated granule representing lateral crest such as is seen in both adults and young of *L. shoplandi*. *Tail* as in the latter, but more closely granular. *Pectinal teeth* 20.

Measurements in mm.—Total length 26, carapace 3, tail 15.

Loc. Burma: Shwegoo, near Bhamo (*Fea*).

Although the only known specimen of this species is certainly young, it represents a form differing in the blackness of its appendages and tail from the young of *L. shoplandi*, which resemble the adults in colour.

Subfamily CENTRURINÆ.

Centrurini, *Pocock, A. M. N. H.* (6) xvii, p. 428, 1896; *Kraep. Tierr., Scorp. etc.* p. 64, 1899 (=Isometrini and Centrurini, *Kraep. Jb. Hamb. wiss. Anst.* viii, p. 149, 1891).

Legs of 3rd and 4th pairs without tibial spurs.

Distribution. Eastern Mediterranean area (*Plesiobuthus*); Oriental Region, thence eastwards as far as Australia (*Isometrus*); Sonoran and Neotropical Regions (*Zabius, Tityus,* and *Centrurus*).

The two known British Indian genera* may be tabulated as follows:—

a. No vesicular spine beneath aculeus; terga tricostate; protarsi of anterior legs depressed and thickly fringed with hairs.... PLESIOBUTHUS, p. 43.
b. A strong vesicular spine beneath aculeus; terga with only one median crest, protarsi of anterior legs not depressed and not fringed with hairs .... ISOMETRUS, p. 44.

PLESIOBUTHUS, gen. nov.

Superficially closely resembling *Buthus.*

Anterior *pedal spur* very long, stout, undivided but hairy, much larger than the posterior spur; a conspicuous spiniform process from the protarsus projecting downwards alongside the posterior spur, so that there appear to be three pedal spurs. *Protarsus* of 1st, 2nd, and 3rd legs strongly depressed, with sharp fringed posterior edge; tarsi also depressed though to a lesser extent, and hairy; claw-lobe very short and tuberculiform; claws very long, nearly as long as the tarsus and nearly straight. Immovable fang of *mandible* armed below with 1 or 2 teeth. Finger of *chela* armed with many rows of teeth, the enlarged teeth of the inner series placed near the middle of the rows of the median series. *Carapace* with straight anterior border, four lateral eyes on each side and carinate ocular tubercle, but without other keels. *Terga* tricostate, lateral crests weak. *Tail* as in *Buthus*, but somewhat depressed, the supero-lateral keels very strong on segments 1–3; vesicle without spine beneath aculeus. *Sternum* triangular.

Type and only known species, *P. paradoxus.*

Distribution. Northern Baluchistan.

This genus so closely resembles *Buthus* in a general way, and particularly that species, inhabiting the same area, which Birula has recently made the type of his subgenus (? genus) *Liobuthus*, that it is hard to believe the likeness is not due to actual affinity. The resemblance, however, is exactly paralleled by that which obtains between *Isometrus* and *Lychas*; and this, in the present state of our knowledge touching the constancy of the tibial spurs, is assumed to be due to similarity of surroundings and mode of life; and since the resemblance in the latter case is attributed to the causes named, there appears to be no logical ground for doubting their efficacy in producing the similarity observable between *Plesiobuthus* and *Liobuthus.* But if in the future it be shown that the tibial spurs have been lost indepen-

* In the British Museum there is an example of a Central-American species of *Centrurus* (*C. infamatus*) ticketed Ceylon. This locality is probably erroneous, and due to the misplacement of a label. If accurate the specimen must have been artificially introduced, and need not be considered in the present work.

dently by *Plesiobuthus* and *Isometrus*, the former being a descendant of *Buthus* and the latter of *Lychas*, it will be difficult to find valid reasons for upholding the groups Buthinæ and Centrurinæ.

31. **Plesiobuthus paradoxus**, sp. n.

Colour mostly a fairly uniform yellow; ocular tubercle and frontal area of carapace infuscate; middle line of tail and its superior and supero-lateral crests, as well as the sides of the vesicle and the three inferior keels of the 5th caudal segment, infuscate; chelæ and legs yellow, with keels infuscate. *Carapace* as long as the 5th caudal segment; finely granular. *Terga* closely granular. *Sterna* smooth, finely granular at the sides; the last with two granular crests, the median pair being obsolete. *Tail* about five and a half times as long as the carapace, the first three segments subequal in width, 4th much narrower than 3rd and 5th than 4th; median lateral keel present only on the posterior half of the 1st segment, absent on the rest; inferior median keels smooth on segments 1 and 2, scarcely granular on 3 and 4; the rest of the keels granular: intercarinal spaces of tail smooth, or at most finely granular; *vesicle* narrower than 5th segment, smooth, punctured below; aculeus long and lightly curved. *Chelæ* with humerus, brachium, and hand granularly crested; hand wider than brachium; underhand about half the length of the movable digit; movable digit much longer than carapace, armed with 11 rows of teeth. *Legs* with femora and patellæ armed with granular crests. *Pectines* long, furnished with 37 teeth.

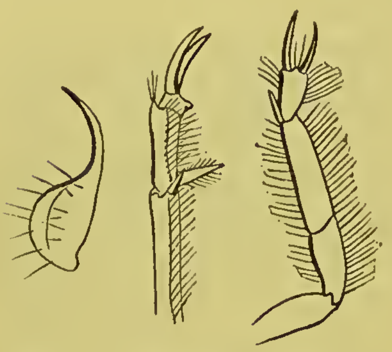


Fig. 11.—*Plesiobuthus paradoxus.*

A. Extremity of 3rd leg, from above. B. Ditto, from the side. C. Vesicle and aculeus.

Measurements in mm.—Total length 56, carapace 6, tail 34, movable digit 6·5.

Loc. Northern Baluchistan (*Maynard & MacMahon*).

Genus ISOMETRUS, Hempr. & Ehrenb.

Isometrus, *Hempr. & Ehr. Symb. Phys., Scorp.* p. 3, 1828; also of *Thorell, Karsch, Simon, Pocock*, etc. (in part) prior to 1891; *Kraepelin, Jb. Hamb. wiss. Anst.* viii, p. 244, 1891, and of subsequent authors.

Terga of *carapace* with only a median keel. *Tail* with a large

spine or vesicle beneath the aculeus. Immovable finger of *mandible* armed beneath with 1 tooth. Finger of *chela* armed with only about five or six median rows of teeth set end to end without overlapping, also with an inner series consisting of six large teeth set close to the apices of the median rows, and an outer series of large teeth corresponding to those of the inner series, and placed in a straight transverse line with them. Protarsal segments of legs cylindrical, sparsely and irregularly hairy.

Type, *I. europaeus*, Linn.

Distribution. Oriental Region, from India as far east as Queensland. (The typical species, *I. europaeus*, has been transported all over the tropics and even to Europe in connection with shipping.)

Synopsis of Indian Species.

a. Posterior surface of brachium rounded, without crests; 5th caudal segment wide and high . . *I. rigidulus*, p. 52.

b. Posterior surface of brachium distinctly carinate; 5th caudal segment low and narrow.

- a^1. Aculeus short, not more than half the length of the vesicle; tarsi furnished with two rows of bristles; pectinal teeth 12–16.
  - a^2. Dorsal keels of 2nd and 3rd caudal segments armed posteriorly with an upstanding spine; pectinal teeth 16 . . . . . . *I. acanthurus*, p. 51.
  - b^2. Dorsal keels of caudal segments not furnished with posterior upstanding spine; pectinal teeth 12–14.
    - a^3. Vesicular spine acutely angular; dorsal surface of abdomen ornamented with a pair of complete longitudinal pale bands . . . . *I. vittatus*, p. 50.
    - b^3. Vesicular spine with rounded apex; dorsal surface of abdomen not ornamented with two complete longitudinal yellow bands.
      - a^4. Colour black, variegated with yellow; tail and hand thinner . . . . . . *I. brachycentrus*, [p. 50.
      - b^4. Colour yellow, variegated with black; tail and hand thicker . . . . *I. basilicus*, p. 49.
- b^1. Aculeus long, nearly as long as vesicle; tarsi thickly hairy beneath.
  - a^5. Superior keels of 2nd and 3rd caudal segments ending in an acute upstanding spine; last abdominal sternum with only a pair of crests . . . . *I. assamensis*, p. 48.
  - b^5. Superior keels of 2nd and 3rd caudal segments not spined; last abdominal sternum with four crests.
    - a^6. Pectines in ♀ furnished at base with rounded expansion above first tooth . . *I. thwaitesi*, p 48.
    - b^6. Pectines in ♀ without lobate basal expansion.
      - a^7. Pectinal teeth 15–16; ante-ocular

area with a median elongate yellow patch; hand in ♂ thick.......... *I. thurstoni*, p. 47.
b⁷. Pectinal teeth 17–19; ante-ocular area with a large triangular yellow patch; hand in ♂ thin .... *I. europæus*, p. 46.

32. **Isometrus europæus**, *Linn. Syst. Nat.* ed. 10, p. 625, 1758 (Scorpio); *Lönnberg, A. M. N. H.* (7) i, p. 86, 1897 (Isometrus): maculatus, *De Geer, Mém. Hist. Ins.* vii, p. 346, pl. xli, figs. 9 & 10, 1778 (Scorpio); *C. L. Koch, Arachn.* xii, p. 1, fig. 960, 1845 (Lychas); *Thorell, A. M. N. H.* (4) xvii, p. 8, 1876; *Simon, Ann. Mus. Genov.* xx, p. 370, 1884; *Oates, Jour. Bom. N. H. Soc.* iii, p. 250, figs. 3, 4, 1888; *Kraep. Jb. Hamb. wiss. Anst.* viii, p. 245, 1891 (Isometrus): dentatus & americanus, *Herbst, Nat. Ungeflügelt. Ins.* iv, pp. 55 & 60, pl. vi, figs. 2, 3, 1800 (Scorpio): filum, *Hempr. & Ehrenb. Symb. Phys., Scorp.* p. 3, t. i, fig. 3, 1828 (Buthus (Isometrus)).

Colour yellow varied with black; carapace marked in front with an anteriorly-expanding triangular yellow patch reaching the anterior border. *Terga* ornamented along the posterior border with five black spots, separated by six spots of a clear yellow tint. *Sterna* yellow, the last obsoletely lined with black. On the *tail* the black on the upper side is represented mostly by small spots along the keels; on the under side, the black forms a network; *hand* externally spotted; fingers brown, black at base, yellow at tips.

♀. *Carapace* evenly granular throughout; about as long as the 1st and half the 2nd caudal segments or as the 4th. *Terga* evenly granular. *Sterna* smooth, the last granular throughout, with four granular crests. *Tail* slender, about five and a half times the length of the carapace, evenly granular; 1st segment longer than wide, 4th about three times as long as wide; median lateral keel practically absent on the 2nd; vesicle (fig. 12, A) granular below; the spine triangular-pointed, furnished with a single anterior denticle, separated at its origin from the aculeus by a space equal to the thickness of its own base or of that of the aculeus. *Chelæ* finely granular and granularly crested; brachium with an upper and a median crest on its posterior side; hand smooth, keelless, scarcely as wide as brachium; underhand less than half the length of the movable finger, which is longer than the carapace. *Pectinal teeth* 17–19 (♂, ♀).

Fig. 12.—A. *Isometrus europæus*: vesicle and aculeus.
B. Ditto: extremity of chela of male.
C. *Isometrus thurstoni*: extremity of chela.

♂ with well-marked secondary sexual characters. *Tail* exceedingly long, eight times as long as carapace; 1st caudal segment more than twice as long as wide, 4th about one and a half times as long as carapace and five times as long as wide. *Chelæ* also very long and slender; hand (fig. 12, B) slender, parallel-sided, not wider than brachium, its width about one-third the length of the underhand, which is at least two-thirds the length of the movable finger.

Measurements in mm. (specimens from Bombay).—♀. Total length 49, carapace 5, tail 28, underhand 2·5, movable finger 6. ♂. Total length 62, carapace 5, tail 42, underhand 4·5, movable finger 7.

Loc. Introduced in connection with shipping from the Oriental Region all over the tropical and subtropical parts of Asia, Africa, and America. So far as British India is concerned, the species has been found in Bombay, Karáchi, Ceylon (Trincomali and Peradeniya), Burma (Rangoon, Akyab, &c.), and the Andaman Islands.

The wide distribution and sexual variability of this species account, to a great extent, for its long list of synonyms.

33. **Isometrus thurstoni**, *Pocock, Jour. Bom. N. H. Soc.* vii, p. 297, 1893; *Kraep. Tierr., Scorp. etc.* p. 67, 1899.

Allied to the preceding.

♀. Coloured very much as in *I. europæus*, but the yellow triangle in front of the ocular tubercle reduced to a small spot, which is slightly broader behind than in front and does not quite reach the anterior margin; the ground-colour of the body and its appendages is darker, the median longitudinal band on the terga more conspicuous, whereas the tail, legs, and chelæ are not so variegated, being of a more uniform yellowish-brown tint. Structurally the ♀ much resembles that of *I. europæus*, but the vesicle is very noticeably stouter; the spine smaller and farther removed from the base of the aculeus. Hand larger than in *I. europæus*, as wide as brachium; length of underhand at least half that of movable digit. *Pectinal teeth* 14–16.

♂. Differing from ♂ of *I. europæus* in the same characters of colour and form of vesicle as the ♀, and sexually modified in much the same way, with tail and chelæ long. The tail, however, is not so long as in *I. europæus*, about 7½ times as long as the carapace; 4th segment not four times as long as wide. Chelæ differing from those of *I. europæus* in having the brachium only about four times as long as wide, the hand (fig. 12, C) inflated, much wider than the brachium, its width at least half the length of the underhand, and the immovable finger sinuous in the proximal half, so that when closed the two are not in contact at base.

Measurements in mm. of ♂ (type) from Shevaroy Hills.—Total length 67, carapace 6, tail 45, underhand 5, width of hand 2·5.

Loc. From Central India (Bhopal, *Dane*) southwards through Belgaum and the Kolhapur State (*Wray*), into the Madras Presidency: Cuddapah (*Popert*), Coonoor, Yercaud in the Shevaroy Hills (*Henderson*), Trichinopoly (*Popert*), and Tinnevelly (*Barber*). There are also two specimens in the British Museum labelled Ceylon.

Immature examples of this species are difficult to distinguish from those of the preceding. Moreover, the sexual characters of the male seldom attain the development presented by the type. Nevertheless, the chelæ never approach the form characteristic of the male of *europæus*.

34. **Isometrus assamensis**, *Oates, Jour. Bom. N. H. Soc.* iii, p. 250, 1888; *Pocock, in Weber's Reise Niederl. O.-Ind.* iii, p. 90, 1893.

♀. Coloured almost as in *I. europæus*, but with the yellow anteocular triangle practically obliterated and the tail much less spotted, the 5th segment being a deep uniform brown all over and the brown on the others restricted to the under surface and to the posterior end of the lateral surface. Chelæ and legs less spotted than in *I. maculatus*; patellæ of legs with only two black bands. Much smaller than *I. europæus*; *carapace* more deeply emarginate in front. Last *sternum* of abdomen with a pair of keels only, the median pair obsolete. *Tail* about five times as long as the carapace, granular and carinate as in *I. europæus*, but the superior keels of the 2nd and 3rd segments each ending in a distinct spiniform tubercle; *vesicle* almost as in *I. europæus*, but neither the spine nor the aculeus so long as in that species. *Chelæ* with brachium broader as compared with its length and finger shorter than in *I. europæus*, the finger as long as the carapace and about twice the length of the underhand. *Pectinal teeth* 14–16 (♂, ♀).

♂. Tail about six times as long as carapace; spiniform tubercles on 2nd and 3rd segments larger than in ♀; vesicle more parallel-sided than in *I. europæus*, the posterior (inferior) border of the spine and vesicle in the same straight line, whereas in *I. maculatus* the vesicle diverges at an obtuse angle. *Chelæ* practically resembling those of the ♀, and not strikingly modified as in *I. europæus* and *I. thurstoni*.

Measurements in mm.—♀. Total length 36, carapace 4, tail 22. ♂. Total length 35, carapace 3·2, tail 22.

Loc. N.E. India: Dhubri in Assam (*Smart*).

35. **Isometrus thwaitesi**, *Pocock, Jour. Bom. N. H. Soc.* xi, p. 114, 1897; *Kraep. Tierr., Scorp. etc.* p. 67, 1899.

Much resembling *I. europæus* in colour; but the ocular tubercle marked with a median yellow stripe, and the anterior black patch gives off an obliquely longitudinal black stripe, which runs forwards and inwards to meet its fellow of the opposite side in the middle

of the anterior border; the black on the tail forms a more distinct network, surrounding circular or oval yellow spots; vesicle black, with round yellow spots; the chelæ, too, including the hands and fingers, are black with round yellow spots. Structural features practically as in *I. europæus*, though the brachium is a little broader as compared with its length, being very perceptibly broader than the hand. Differing from the rest of the species in possessing a semicircular lobate expansion at the base of the shaft of the pectines, such as is found in the allied American genus *Tityus*, where it is confined to the female.

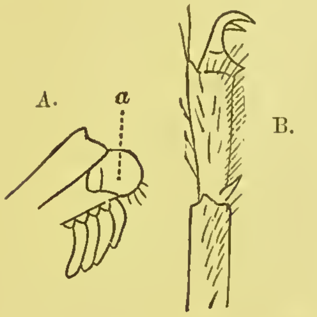


Fig. 13.—A. Base of pecten showing lobe (*a*) of *Isometrus thwaitesii*.
B. Tarsus and extremity of protarsus of 4th leg of *Isometrus europæus*.

Measurements in mm.—Total length 34, carapace 3·8, tail 22.
Loc. Ceylon (*Thwaites*).

36. **Isometrus basilicus**, *Karsch, MT. Münch. ent. Ver.* iii, p. 113, 1879; *Simon, Ann. Mus. Genov.* xx, p. 370, 1884; *Kraep. Jb. Hamb. Wiss. Anst.* xiii, p. 127, 1896; *id. Tierr., Scorp. etc.* p. 68, 1899.

Colour variegated yellow and black, yellow predominating; ante-ocular area of carapace mostly yellow; terga with median keel, lateral border, ><-shaped marks, and a round spot on each side of the middle line yellow; sterna yellow, marbled with black; tail yellow, darker posteriorly, slightly spotted laterally, more strongly lined beneath with black, vesicle slightly spotted below; chelæ yellow, a few black spots on humerus, brachium, and hand; hand at base of immovable finger black; fingers black, with yellow tips; legs yellow, with a few black spots.

Fig. 14.—*Isometrus basilicus*, ♂.
A. Vesicle and aculeus.
B. Extremity of chela.

♀. *Carapace* granular throughout, only a little shorter than the 1st and 2nd caudal segments and quite as long as the 5th. *Terga* granular, like the carapace. Last *sternum* with the median pair of keels obsolete, the laterals complete. *Tail* short, only a little more than four times as long as the carapace; 1st segment about as long as wide, 4th less than 5th, a little more than twice as long as wide;

intercarinal spaces scarcely granular; keels evenly granular; *vesicle* with spine not acute, wide at the base, its free edge semicircularly rounded, armed in front with four small denticles, close to aculeus, the intervening distance less than half the thickness of the base of the aculeus; aculeus very short, barely half the length of the vesicle. *Chelæ* weakly granular; brachium armed in front with some half-dozen tooth-like tubercles; hand keeled, distinctly wider than brachium, width more than half the underhand; the latter nearly as long as the movable digit, which is about equal to the carapace and furnished with 6 rows of teeth. *Tarsi* furnished beneath with two rows of hairs. *Pectinal teeth* 13–14.

♂. Tail very long, more than six times the length of the carapace, which is equal to its 2nd segment; 1st segment about twice, 4th about three times as long as wide; keels and intercarinal spaces smoother than in ♀, superior keels of 2nd and 3rd segments each ending in a triangular tooth; chelæ with hand smoother and a little thicker and longer than in ♀, the length of the underhand being equal to that of the movable finger.

Measurements in mm.—♀. Total length 40, carapace 4·5, tail 23. ♂. Total length 56, carapace 5, tail 38.

Loc. Ceylon: Peradeniya (*Sarasin*), Haldumullah (*Green*).

37. **Isometrus brachycentrus**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 263, 1899.

♀. Nearly allied to the preceding, but much darker in colour. Upper side of trunk deep blackish brown, anteocular area of carapace black; terga with a clear circular spot on each side of the middle line, also a paler lateral submarginal band; tail reddish brown, the median inferior intercarinal space marked with a black stripe; 5th segment, with exception of its anterior part, entirely black; chelæ mostly a uniform reddish brown or clearer reddish yellow; legs strongly infuscate externally, the femur and patella of the posterior legs being almost wholly black with only one or two yellow spots; abdominal sterna, except the 5th, not infuscate. Structurally almost as in *I. basilicus*, but the *tail* thinner, about six times as long as the carapace, the 1st segment longer than wide, the 4th a little more than twice as long as wide. *Chelæ* also as in *I. basilicus*, but hand a little smaller, scarcely exceeding brachium in width. *Pectinal teeth* 12.

Measurements in mm.—Total length 42, carapace 4, tail 24.

Loc. Mangalore (*Battie*) and Kanara (*Bell*), on the Malabar coast.

38. **Isometrus vittatus**, sp. n.

♀. *Colour*: carapace varied with yellow and brown; upper side of abdomen with two complete yellow bands, separated from each other by a complete median brown band about equal to them in width, and from the external margin by a similar brown band; sterna pale; tail uniformly yellowish brown, a little darker posteriorly; chelæ with humerus and hand pale; brachium, except for its pale

basal portion, and base of digits infuscate; legs externally variegated. Upper side of *body* closely and entirely covered with larger and smaller granules; a row of coarser granules along posterior border of *terga*; last *sternum* closely granular throughout, and furnished with four granular keels. *Tail* slender, about four times as long as carapace, closely granular, normally keeled; median lateral keel present only on 1st segment, merely represented on the 2nd posteriorly by about three granules; *vesicle* smooth, long, about twice as long as aculeus; spine large, triangularly pointed, its inferior edge continuous with the corresponding edge of the vesicle, its upper edge furnished with a pair of tubercles; distance between spine and base of aculeus scarcely equal to diameter of base of aculeus; aculeus moderately long. *Chelæ* with humerus and brachium granular and normally keeled; brachium wide, only twice as long as wide, and furnished in front with about half-a-dozen denticles; hand large, wider than brachium, smooth, not crested; fingers short, in contact, movable only slightly longer than underhand, furnished with 7 rows of teeth. *Pectinal teeth* 12–13. *Tarsi* furnished below with a few setæ, arranged in two rows.

Measurements in mm.—Total length 23, tail 13, carapace 3.

Loc. Madras (*Henderson*).

A single female example.

39. **Isometrus acanthurus**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 264, 1899.

♂. Allied to the preceding species, and most nearly resembling *I. basilicus* in colour. Carapace lined with black; anteocular region black, with a few small yellow spots; terga with six yellow and five black longitudinal bands; 4th and 5th sternal plates lined with black; tail delicately lined with black; chelæ and legs yellow spotted with black, black on brachium predominating and circumscribing definite yellow spots; hand almost entirely yellow, not black at base of fingers; fingers not black, but yellow and spotted with black. Upper side of *trunk* granular, and crested as in the preceding species; *carapace* as long as the 2nd caudal segment; 5th abdominal *sternum* marked with four complete and equal granular keels. *Tail* long and slender, about seven times the length of the carapace; keels stronger than in *I. basilicus*, and the terminal granule on the superior keels on 2nd and 3rd segments long, erect, and spiniform; *vesicle* with coarsely granular crests below; spine not so thick as in the preceding species, triangular, but with blunt, not rounded or sharp apex, armed with only two denticles; aculeus short and curved. *Chelæ* much as in *I. basilicus*, but the front of the brachium normally crested and subdenticulate, not furnished with a few large teeth; hand smooth, wider than brachium, its width about half the length of the underhand; movable digit as long as underhand, not so long as carapace, furnished with 7 rows of teeth. *Pectinal teeth* 16.

Measurements in mm.—Total length 39, carapace 4, tail 27.
Loc. Matheran (*Phipson*).
Female unknown.

40. **Isometrus rigidulus**, *Pocock, Journ. Bom. N. H. Soc.* xi, p. 113, 1897; *Kraep. Tierr., Scorp. etc.* p. 66, 1899.

Colour varied yellow and black; anteocular area of carapace black, with two small yellow spots in front of the black tubercle; terga yellowish round the margins, and with yellow ><-shaped marks; sterna weakly infuscate at the margins, the 4th and 5th also infuscate mesially; tail weakly lined with black below, black increasing in amount on the posterior segments, the 5th being almost entirely black; vesicle variegated; chelæ with humerus and brachium black, yellow-spotted; hand and fingers yellow, black-spotted. *Carapace* and *terga* coarsely and evenly granular throughout; carapace as long as 5th caudal segment, longer than 1st and half the 2nd. *Sterna* smooth, the last granular throughout, with four granular keels. *Tail* about five times as long as carapace, 1st segment about as long as wide, 4th about twice as long as wide; intercarinal spaces closely and rather coarsely granular throughout; keels strong, coarsely granular, dorsal keel of 3rd ending in a long and strong upstanding spine; 5th segment dorsally much elevated, so that the height of the segment is greater than the width and nearly half the length; *vesicle* coarsely granular below, the spine triangular, pointed, armed with one tooth, and separated from the aculeus by a space which nearly equals the width of the latter; aculeus more than half the length of the vesicle. *Chelæ*: brachium without crests on its posterior surface, which is rounded, upper crests granular; hand smooth, about as wide as the brachium; movable finger about as long as the carapace and one fourth longer than the underhand, furnished with 7 rows of teeth. *Tarsi* furnished beneath with 2 rows of long setæ. *Pectinal teeth* 13–15.

Measurements in mm.—Total length 29, carapace 3, tail 15.
Loc. Central India: Bhopal (*Dane*).

The following species belonging to the family Buthidæ is of doubtful generic position, though probably referable to *Lychas* or *Isometrus*, and very possibly specifically identical with *Isometrus europæus*:—

Scorpio (Atreus) spinax, *Gervais, Arch. Mus. Paris,* iv, p. 225, 1844.

Total length 53 mm., tail 30. A single dorsal keel. Pectinal teeth 19.
Loc. India.

Family CHÆRILIDÆ.

Pedal spurs two, as in the *Buthidæ*; but the anterior never double. *Sternum* of cephalothorax pentagonal, parallel-sided, with a posterior rounded median pit: as long as wide or longer than wide. *Pectines* very short, scarcely segmented. *Maxillary processes* of 1st pair of legs (fig. 15, *a*) expanded at the anterior extremity, with broadly truncate anterior border. *Stigmata* (fig. 15, *c*) circular. *Carapace* narrowed in front, its anterior border transversely truncate;

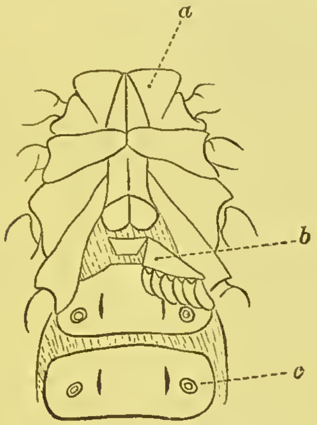


Fig. 15.—Lower side of cephalothorax and of anterior abdominal somites of *Chærilus*, showing (*a*) the expanded maxillary process of the 1st leg; (*b*) the unsegmented shaft of the pecten, and (*c*) the circular stigma.

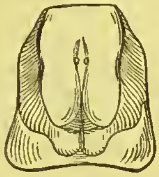


Fig. 16. Carapace of *Chærilus*.

two lateral eyes on each side, and beneath them an amber-coloured spot. Movable and immovable fingers of *mandible* armed below with a series of small teeth. Fingers of *chelæ* never lobate, furnished with many overlapping rows of small teeth, the terminal tooth of each series on the outer side enlarged. *Tarsi* (fig. 5 B, p. 8) furnished beneath with two series of stout bristles and a median series of very fine spicules. Males usually with longer narrower chelæ than females, and slightly or considerably longer tail; vesicle of tail sometimes much modified in male.

Genus **CHÆRILUS**, Simon.

Chærilus, *Simon, Ann. Soc. Ent. France* (5), vii, p. 238, 1877; *Karsch, MT. Münch. Ent. Ver.* iii, p. 101, 1879; *Pocock, in Weber's Reise Niederl. O.-Ind.* iii, p. 91, 1890; *Kraepelin, Jb. Hamb. Wiss. Anst.* xi, p. 141, 1894; *id. Tierr., Scorp. etc.* p. 157, 1899.
Chelomachus, *Thorell, Ann. Mus. Genova,* xxvii, p. 583, 1889.
Uromachus, *Pocock, A. M. N. H.* (6) v, p. 250, 1890.

Characters of the family.

Distribution. Ceylon: Himalayas from Kashmir to Assam; Burma, Malacca, Sumatra, Java, Borneo, and Celebes.

The genus *Chelomachus* was based upon a character occurring in an immature individual; *Uromachus* upon the peculiar form of vesicle found in the male of the species described below as *Chærilus pictus*.

Synopsis of Indian Species.

a. Hand furnished with only five keels, three above and two bordering the underhand below; last abdominal sternum with four granular crests; crests on hand marked with a single row of shining granules, which are much more conspicuous than those covering the rest of the surface; length of fingers and granulation of carapace as under *b′* .... *C. tricostatus*, p. 59.

b. Hand furnished with seven keels (in addition to a weak crest on its inner surface), five on its upper surface and two bordering the underhand below; last abdominal sternum without crests; granules on keels of hand small and close-set, not or hardly larger than those covering the rest of its surface.

a′. Ocular tubercle and anteocular area of carapace closely covered with granules; fingers very short, the movable strongly curved, shorter than width of hand and much shorter than carapace; width of immovable at base about two-thirds of its length .... *C. ceylonensis*, p. 62.

b′. Ocular tubercle and at least the posterior half of the anteocular area of the carapace smooth; fingers longer, the movable lightly curved, exceeding the width of the hand, and at most only a little less than the carapace; basal width of immovable less than half its length.

a². Vesicle inflated, when viewed from the side not passing gradually and without constriction into the aculeus; base of aculeus subcylindrical, much narrower than adjacent portion of the vesicle and much longer than wide.

a³. Chelæ long; humerus, brachium, and underhand subequal to or longer than the carapace; pectines large, their length from base of shaft to tip of apical tooth about as long as patella of 3rd leg.

a⁴. Width of 1st caudal segment exceeding length of 4th; 2nd caudal segment longer than wide:

humerus, brachium, and underhand all exceeding length of carapace; humerus more than twice as long as wide; width of hand less than half the length of the underhand; terga smooth .... *C. insignis* ♂, p. 58.

b^4. Width of 1st caudal segment equal to length of 4th, 2nd wider than long; humerus shorter than brachium, and underhand equal to length of carapace; width of hand always more than half the length of underhand.

a^5. Terga smooth, only obsoletely granular; frontal area of carapace weakly granular anteriorly; inferior median keels of 2nd caudal segment granular.. *C. margaritatus* ♂, [p. 58.

b^5. Terga very distinctly and closely granular throughout, frontal area of carapace coarsely granular anteriorly; inferior median keel of 2nd caudal segment smooth .... *C. anthracinus* ♂, [p. 57.

b^3. Chelæ short; humerus, brachium, and underhand considerably shorter than carapace; pectines small, length from base of shaft to tip of apical tooth much less than patella of 3rd leg.

a^6. Abdominal terga so densely and uniformly covered throughout with granules that no visible interspaces are left; trunk and chelæ blackish, legs yellowish brown .. *C. anthracinus* ♀, [p. 57.

b^6. Abdominal terga studded with pearl-like granules separated by very distinct interspaces; body and chelæ dull brown.

a^7. Frontal area of carapace weakly granular throughout, the granules at most only a little coarser anteriorly; hand wider, its width about equal to length of humerus; trunk and limbs uniformly coloured .... *C. margaritatus* ♀, [p. 58.

b^7. Frontal area of carapace smooth behind, coarsely granular anteriorly; hand narrower, its width noticeably less than length of humerus; trunk and limbs variegated .... *C. granosus*, p. 56.

b^2. Vesicle much less inflated, flatter beneath, as high as 5th caudal segment, and, when viewed from the side, passing gradually and without constriction into the aculeus; aculeus less

than half the length of the vesicle; its basal portion, seen laterally, broad, triangular, about as wide as long.

a^{5}. Upper side of body in ♀ closely covered with large pearl-like granules; intercarinal spaces of tail very distinctly granular; much darker.. *C. gemmifer*, p. 60.

b^{5}. Upper surface of body furnished with only a few coarse granules scattered here and there; intercarinal spaces of tail and of hand almost smooth; much paler and more distinctly variegated........................ *C. pictus*, p. 61.

41. **Chærilus granosus**, sp. n.

♀. *Colour.* Upper side of body blackish brown, mottled with yellowish red; terga with median and lateral yellow patch and ><-shaped yellow mark; tail and chelæ reddish brown with black keels, fingers black; vesicle reddish yellow, usually mottled below with blackish grey; legs mostly fuscous with yellowish-red markings, paler towards the apex. *Carapace* for the most part covered with granules, especially at the sides, the ocular tubercle and the posterior half of the anteocular area, as well as the portion of the upper surface on the inner side of the two crests smooth; a little longer than the 1st and 2nd caudal segments, to about the same extent shorter than the 3rd and 4th, and about as long as the 5th. *Terga* coarsely granular throughout, the granules shining and separated from each other by very distinct, almost smooth interspaces, from the 3rd to the 6th furnished on each side with a larger marginal granule representing an incipient lateral keel; the last with four granular crests. *Sterna* smooth, the last granular at the sides, not crested. *Tail* about four times as long as the carapace; the upper surface sparsely granular in the middle, the granules showing a tendency to run into a pair of converging longitudinal series; sides of tail and keels coarsely granular except the inferior median crests of the 1st segment, which are smooth and obsolete; median lateral crest present on 1st segment and extending throughout half the length of the 5th, practically absent on the rest; width of 1st about equal to length of 4th, 2nd as wide as long; upper edges of 5th square and coarsely granular; lower keels of 5th denticulate, the median posteriorly bifid; anal border denticulate, with lateral bifid lobe; *vesicle* (see fig. 18, A) granular at the sides, smooth above and in the middle line below; piriform and subglobular, a little wider than high, width equal to that of 4th segment, height exceeding that of 5th and more than half the length of the vesicle; basal half of aculeus slender, subcylindrical, much longer than thick, and marked off from vesicle by a distinct constriction, so that when viewed from the side the two do not pass continuously into each other. *Chelæ* with humerus, brachium, and underhand all shorter than carapace; humerus coarsely granular and crested above and in front, less

strongly but distinctly granular below, mostly smooth behind except for a granular crest on its upper half; brachium furnished with five granular crests above, behind, and below, with the interspaces also granular; hand granular throughout, furnished with eight strong granular keels in addition to a small crest on the middle of its inner surface, the keels more coarsely and closely granular than the interspaces; width of hand less than length of underhand by about one fifth of its length; underhand less than movable finger, which almost equals carapace; inner edge of hand lightly convex, subparallel to the outer border, posterior lobe rounded, not surpassing posterior border of the outer side of the upper surface; movable finger with 9 rows of teeth. *Legs* with protarsi, except of 4th, spined posteriorly, and including that of the 4th armed with a posterior distal spine; femora of 3rd and 4th and also patella of 4th finely granular externally. *Pectinal teeth* 4.

Measurements in mm.— ♀. Total length 52, carapace 7, tail 28, brachium 5·8, underhand 5, movable finger 6, width of hand 4.

Loc. Western Himalayas: Mussooree (*Rattray*).

42. **Chærilus anthracinus,** sp. n.

Closely allied to the preceding, of which perhaps it will prove to be a subspecies.

♀. *Colour* of body much more uniformly black or deep brown, the yellowish-red mottling being scarcely traceable; legs also much more uniformly coloured, but yellowish brown and contrasting with the dark tint of the body much more forcibly than in *C. margaritatus*. Upper side of *trunk* granular as in that species, but much more closely, the terga being almost entirely covered, with scarcely any interspaces between the granules. *Chelæ*, on the contrary, distinctly less coarsely granular than in *C. margaritatus*; the keels on the hand and the posterior side of the brachium being nearly smooth, the granulation presenting a scale-like appearance as if rubbed down; hand distinctly wider, its width about equal to the length of the humerus and almost equal to the length of the underhand. *Pectinal teeth* 4.

♂. Sexual characters as in *C. margaritatus*. Tergal plates more finely, and even a little more closely granular than in the ♀, coarsely shagreened. Pectinal teeth 6.

Measurements in mm.— ♀. Total length 51, carapace 7, tail 30, brachium 6, underhand 6, movable finger 6·5, width of hand 5·2.

♂. Total length 44, carapace 6·5, tail 27, brachium 6·5, underhand 6·5, movable finger 6, width of hand 4·5.

Loc. Dalhousie in the Western Himalayas (*Townsend*).

Subspecies **rufescens,** nov.

♂. Differing from the typical form in being more coarsely and less closely granular. Not so dark in colour, the chelæ reddish brown, with black crests and the legs lightly variegated as in *C. granosus*; terga dark, with a very indistinct ><-shaped

mark and with three distinct reddish spots—one on the posterior border, one in the middle line, and one on the lateral angle. *Pectinal teeth* 5.

Measurements in mm.—Total length 45, carapace 6·3, tail 25, brachium 6·2, underhand 6, movable finger 5·6, width of hand 4.

Loc. Dharmsála in the Western Himalayas (*Fulton*).

43. **Chærilus margaritatus,** *Pocock, A. M. N. H.* (6) xiii, p. 79, 1894.

Colour of ♂ and ♀ tolerably uniform brown, the legs paler; not so dark as in *C. anthracinus* and not variegated as in *C. granosus*. Male differing from that of *C. anthracinus* in having the upper side of the abdomen almost smooth, at most very finely granular, with a row of coarser granules along the posterior border whereon the two tubercles are very prominent; the granules on the anterior half of the frontal area of the carapace not so coarse. *Tail* rather more than four times as long as carapace; width of 1st segment about equal to length of 4th, 2nd a little wider than long; inferior median keels on 2nd granular. *Chelæ* much like those of *C. anthracinus*, the hand a little narrower as compared with its length (*cf.* measurements).

♀. Resembling ♀ of *C. granosus* in granulation of terga, but with the granules not extending to the lateral borders as they do almost invariably in that species; differing from the latter and from ♀ of *C. anthracinus* in having the frontal area of the carapace granular behind as well as in front, sometimes evenly but sparsely granular throughout, at others more coarsely granular in front. *Hand* of very much the same shape and size as in *C. anthracinus*. *Pectinal teeth* 5 in ♂, 3–4 in ♀.

Measurements in mm.—♀. Total length 50, carapace 6·5, tail 26, brachium 5·5, underhand 5·5, movable finger 6, width of hand 4·9.

♂. Total length 53, carapace 7, tail 30, brachium 7·2, underhand 7, movable finger 7, width of hand 4·5.

Loc. India: Kasauli, near Simla (*Waller Barrow*).

44. **Chærilus insignis,** *Pocock, A. M. N. H.* (6) xiii, p. 82, 1894.

♂. *Colour* (dry specimen) apparently as in *C. margaritatus*. *Carapace* with the same distribution of granules as in the preceding two species, but the granulation less distinct. *Terga* not coarsely or closely but only very finely granular under the lens, the lateral keels marked by a large tubercle. *Tail* much longer than in male of *C. margaritatus* and *C. anthracinus*, more than four times the length of carapace; width of 1st segment considerably less than length of 4th, 2nd segment longer than wide; upper side practically smooth, lateral surface much less granular than in *C. margaritatus*; inferior median keels of 1st standing up as distinct, though only obsoletely granular crests. *Chelæ* granular and keeled as in *C. margaritatus*, very long; humerus longer than carapace, more than twice as long as wide, but shorter than brachium and under-

hand, both of which are thus much longer than carapace; hand (fig. 17, C) long and narrow, the width considerably less than half the length of the underhand, its inner edge straight and parallel with the outer edge; movable finger a little longer than the carapace. *Pectinal teeth* 6.

Measurements in mm.—Total length 64, carapace 9, tail 39, brachium 10·5, underhand 11, movable finger 9·5, width of hand 4·5.

Loc. Ladákh.

45. **Chærilus tricostatus**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 266, 1899.

Colour (dry specimen) a tolerably uniform reddish brown, with blacker markings. *Carapace* granular at the sides, mostly smooth above except for the anteocular triangle, which is granular at

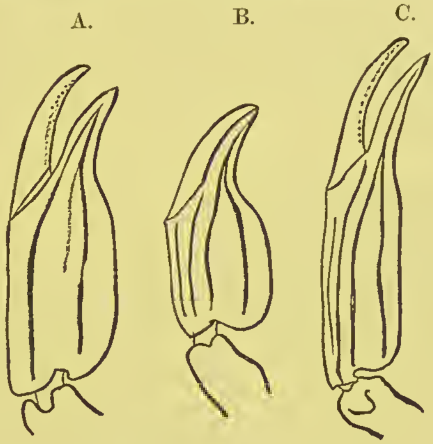


Fig. 17.—A. Hand of *Chærilus tricostatus* ♂. B. Hand of *C. pictus* ♂. C. Hand of *C. insignis* ♂.

least in front; longer than 1st and 2nd caudal segments, about equal to 3rd and 4th and a little longer than 5th. *Sterna* as in the other species, but the last furnished with four short crests, each consisting of a few large granules. *Terga* finely granular. with a few larger pearl-like granules scattered here and there, and a series of them along the posterior border; with distinct lateral crests, those on the 3rd consisting of a single large pearl-like granule, those on the 4th, 5th, and 6th of three similar granules. *Tail* rather less than three times the length of the carapace, width of 1st segment about equal to length of 4th; 2nd about as wide as long; dorsal surface very sparsely granular, lateral and inferior surfaces weakly but not so sparsely granular as the upper surface: all the keels normal and denticulated; the inferior median keels of the 1st segment distinct and consisting of coarse granules like those on the 2nd and on the last abdominal sternum; *vesicle* finely granular below and laterally, of much the same form as in *C. margaritatus* and *C. insignis*. *Chelæ* long; humerus as long as carapace and a little

more than twice as long as wide, weakly granular above and in front except for coarse granules along the keels, posterior surface smooth, inferior surface very weakly granular; brachium a little longer than carapace, the normal keels marked by a single series of low shining granules, the anterior surface furnished with a few large granules on its upper and lower prominences, for the rest the segment is almost entirely smooth; hand (fig. 17, A) finely and closely granular above and externally, more finely granular internally and smooth on the underhand, furnished with only five keels, three above and two bordering the underhand, the keels defined by a single row of shining granules which are much larger than the granules covering the rest of the upper surface; underhand a little longer than brachium and than movable finger; hand parallel-sided, its width a little more than half the length of the underhand; movable finger slightly longer than carapace, furnished with 4 rows of teeth. *Pectinal teeth* 5-6.

Measurements in mm.—Total length 50, carapace 7·5, tail 30, brachium 8, underhand 8·5, movable finger 7·8, width of hand 5.

Loc. Sadiya, Assam.

Female unknown.

46. **Chærilus gemmifer**, *Pocock, A. M. N. H.* (6) xiii, p. 81, 1894; *Kraep. Tierr., Scorp. etc.* p. 159, 1899.

Colour nearly black, varied with yellow; terga with median and lateral marginal yellow spot and yellow > < -shaped mark; tail and chelæ deep reddish brown with black keels; fingers black. *Carapace* with coarse shining granules on the sides, anteocular area weakly and sparsely granular throughout, the area behind the tubercle serially granular; relative length of carapace and caudal segments approximately as in *C. margaritatus*. *Terga* covered with coarse pearl-like granules, much larger and farther apart than in *C. margaritatus*; lateral crests represented by one or two still larger granules. *Sterna* as in *C. margaritatus*. *Tail* approximately as in that species, but smoother below, the four inferior keels of the 1st segment smooth, and the inferior medians of the 2nd at most very weakly granular; *vesicle* (fig. 18, B) not so globular, much less convex below, height less than that of 5th segment, granular above as well as at the sides and below; from the lateral aspect passing without constriction into the base of the

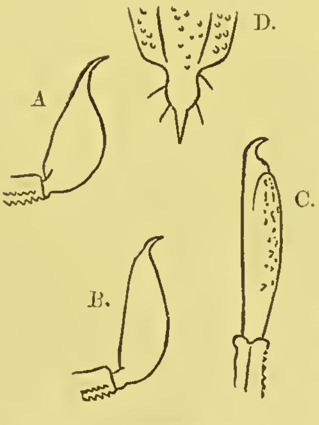


Fig. 18.—A. Vesicle of *Chærilus margaritatus* ♀. B. Vesicle of *C. gemmifer* ♀. C. Vesicle of *C. pictus* ♂, side view. D. Do., upper view of extremity.

aculeus, which is short, nearly as wide at its proximal as at its distal end, where it merges with the spiniform portion; the whole aculeus much less than half the length of the vesicle. *Chelæ* with humerus much less coarsely granular above and in front than in *C. margaritatus*, very finely granular below, smooth behind; brachium with superior granular crest, posterior and inferior surface smooth, anterior surface smooth except for some coarse granules on the inferior crest and on the inferior prominence and two larger granules above; keels of hand normal in number, very finely granular, the interspace covered with a wide-meshed network of granules; width almost equal to length of underhand, the inner edge more strongly convex than in *C. margaritatus*, with much closer, less open concavity where it merges with the immovable finger; fingers more strongly curved. *Pectinal teeth* 4.

Measurements in mm.—Total length 38, carapace 6, tail 24, brachium 4·5, underhand 4·5, movable finger 5·3, width of hand 4·2.

Loc. Sylhet (*Bowring*).

47. **Chærilus pictus**, *Pocock, A. M. N. H.* (6) v, p. 250, pl. xi, figs. 1–1c (1890) (Uromachus): *id. in Weber, Reise Niederl. O.-Ind.* iii, p. 91. 1893; *Kraep. Jb. Hamb. Wiss. Anst.* xi, p. 143, 1894; *id. Tierr., Scorp. etc.* p. 159, 1899 (Chærilus).

♀. *Colour* somewhat as in *C. gemmifer*, but much paler; the yellow or red predominates so that the integument may be described as red varied with black; chelæ deep red with black keels. *Carapace* and *terga* with a few coarse pearl-like granules scattered here and there; anteocular area practically smooth; relative length of carapace and tail-segments as in *C. gemmifer*; intercarinal spaces of tail almost smooth, those of the 5th weakly granular; *vesicle* as in *C. gemmifer*. *Chelæ* with humerus weakly granular, except for the upper and anterior crests, which are coarsely so; brachium almost wholly smooth except for a few coarse granules on the upper crest and a few in front; intercarinal spaces of hand with a very finely granular network, almost smooth; keels very weakly granular; shape of hand as in *C. gemmifer*. *Pectinal teeth* 5.

♂. With tail very long and slender; carapace as long as the 1st and half the 2nd segments, much shorter than the 5th. *Tail* more than six and a half times as long as the carapace, the 1st segment longer than wide, 2nd nearly twice as long as wide, 5th more than four times as long as wide; *vesicle* (fig. 18, C, D) very long, as long as the 5th segment of the tail, flat below, about as wide as the 4th segment, its height equal to that of the 5th, nearly parallel-sided, very coarsely granular, ending distally in a right and left shoulder-like prominence; base of aculeus when seen from above resembling a large cylindrical tubercle, upon the summit of which is situated the strongly bent spiniform distal extremity; when seen from the side the base of the aculeus merges without constriction with the adjacent end of the vesicle. *Chelæ* very much as in female; humerus, brachium, and underhand all shorter than

carapace; hand (fig. 17, B) a little longer than in female, its width about four-fifths its length.

Measurements in mm.—♀ (young). Total length 32, carapace 5, tail 20, brachium 4, underhand 3·8, movable finger 4, width of hand 3·3.

♂ (adult). Total length 61, carapace 6·5, tail 41, brachium 5·5, underhand 5·8, movable finger 5, width of hand 4·5.

Loc. Sylhet (*Stainsforth*).

The male of this species differs strikingly from that of all the others in the peculiar form of the vesicle and the great length of the tail.

48. **Chærilus ceylonensis**, *Pocock, A. M. N. H.* (6) xiii, p. 83 (1894); *Kraep. Tierr., Scorp.* p. 159 (1899).

♂. *Colour* dull brown; ocular tubercle, crests of hand, and digits infuscate. *Carapace* longer than 1st and 2nd caudal segments, as long as 3rd and 4th, longer than 5th, granular throughout, with the exception of the grooves, which are smooth; ocular tubercle granular. *Terga* granular throughout, not or hardly distinctly crested. *Tail* about four times as long as carapace, finely granular; 2nd segment as long as wide, 5th more than twice as long as wide; inferior median keel nearly obsolete on 1st segment; median lateral keel distinct on 1st, represented by a few larger granules on the others, extending over half the lateral surface of the 5th; the rest of the keels distinct and granular; *vesicle* of approximately the same form as in *C. margaritatus*, wider and higher than 5th segment; coriaceous below, but not visibly granular. *Chelæ*: humerus and brachium much shorter than carapace, humerus coarsely granular above and in front, brachium granular above, almost smooth behind and below; hand covered with reticulation of fine granules, keels and base of digits thickly and very finely granular; keels normal in number, but low and very weakly granular; hand nearly parallel-sided; length of underhand greater than width of hand and greater than length of movable digit, which is a little shorter than width of hand; immovable digit furnished with 11–12 rows of teeth, its basal width equal to two-thirds its length. *Pectinal teeth* 5–6.

Measurements in mm.—Total length 44, carapace 5·5, tail 22, brachium 4, underhand 5·5, movable finger 4, width of hand 4·5.

Loc. Trincomali, Ceylon (*Barrett*).

The two following species have been omitted from the synoptical table, since I have had no opportunity of examining actual specimens.

49. **Chærilus birmanicus**, *Thorell, Ann. Mus. Genova.* xxvii, p. 584, 1889 (Chelomachus).

Colour subtestaceous, varied with black. *Carapace* tolerably

coarsely granular, a little shorter than caudal segments 1–3, longer than segment 5. *Terga* very finely coriaceous and granular, with larger granules forming lateral crests on terga 3–6, last tergum more coarsely granular at the sides. *Sterna* smooth, the last without crests. *Tail* about three times as long as the carapace; 2nd segment wider than long; inferior median keels of 1st segment obsolete; vesicle large, wider than segment 5, more than twice as long as wide, smooth. *Chelæ* with hand normally keeled, its width equal to the length of the underhand and less than the movable finger, which is a little shorter than the carapace; keels on hand finely granular, interspaces smooth.

Measurements in mm.—Total length 16, carapace $2\frac{1}{2}$, tail 7, underhand 1·5, movable finger 2, width of hand 1·5.

Loc. Burma: Rangoon (*Fea*).

Unfortunately the only known representative of *C. birmanicus*, which will doubtless prove to be a valid species, is the example of which an abridged description is given above. Judging from its size this example is not half grown. Hence it is not possible to form a just estimate of the characters of the adult, and it is superfluous to attempt to locate the species in our synoptical table.

50. **Chærilus truncatus**, *Karsch, MT. Münch. ent. Ver.* iii, p. 108, 1879; *Kraep. Jb. Hamb. Wiss. Anst.* xi, p. 146, pl. ii, fig. 54, 1894; *id. Tierr., Scorp. etc.* p. 160, 1899 (excluding suggested synonymy).

So far as it goes, the description of this species, published by Kraepelin, is not inapplicable to *C. margaritatus*, *C. granosus*, and also perhaps to *C. anthracinus*, except as regards the form of the hand. The width of this organ in the male is said to be less than half the length of the underhand, and in the female a little more than half; whereas in *C. margaritatus*, *C. granosus*, and *C. anthracinus* (♂, ♀) the width of the hand is much more than half the length of the underhand. The hand of the male of *C. truncatus*, in fact, seems to resemble that of *C. insignis*; but the upper side of the abdomen of the former appears to be much more granular. Presumably also the chelæ and tail are shorter, since nothing is said in the description touching their length.

Loc. Dehra Dun, in the Western Himalayas.

Family VEJOVIDÆ.

With two *pedal spurs* and no *tibial spurs*, as in the Chærilidæ. *Sternum* of cephalothorax pentagonal, nearly always wider than

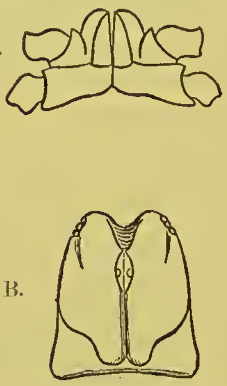


Fig. 19.—A. Coxæ and maxillary lobes of 1st and 2nd legs of *Scorpiops*. B. Carapace of *Scorpiops*.

long. *Pectines* segmented. *Stigmata* elongate. Three lateral *eyes* on each side of carapace. *Maxillary lobes* of 1st pair of legs narrowed, not truncate along the anterior border.

Distribution. Eastern Mediterranean area: North India and Burma; California, Texas, Central America, and along the chain of the Andes to Peru.

Genus **SCORPIOPS**, Peters.

Scorpiops, *Peters, Mon. Akad. Berl.* 1861, p. 510; *Karsch, MT. Münch. ent. Ver.* iii, p. 101, 1879; *Kraepelin, Jb. Hamb. Wiss. Anst.* xi, p. 185, 1894; *id. Tierr., Scorp. etc.* p. 179, 1899.

Anterior border of *carapace* deeply excised in the middle line. Movable finger of *mandible* with a row of 4–6 small teeth below. Movable finger of *chela* furnished along the middle line with numerous small teeth arranged in a double row; an outer series consisting of small teeth arranged in pairs, and an inner series consisting of a few larger teeth confined to the distal half of the finger. *Hand* generally large, flattish above, with usually strong finger-keel dividing the upper surface into an outer vertical and an inner horizontal portion. *Tarsi* with median inferior row of spinules and a row of setæ on each side.

Type, *Scorpio hardwickii*, Gervais.

Distribution. The Deccan; Himalayas from Punjab to Assam, thence through Burma to S. Tenasserim.

Synopsis of Indian Species.

a. Brachium of chela armed at base in front with a pair of small tubercles.
- *a*[1]. Upper and posterior crests upon the hand and brachium very strong and smooth.
  - *a*[2]. Upper surface of hand without a smooth crest lying longitudinally between the finger-keel and the inner border and ornamented with granules which frequently run together into ridges; length of underhand exceeding width of hand, especially in ♂, in which the chelæ are elongate .... *S. hardwickii*, p. 66.
  - *b*[2]. Upper surface of hand with a smooth longitudinal crest between the finger-keel and the inner border and ornamented with a coarse network of perfectly smooth ridges resulting from the anastomosis of low tubercles; width of hand exceeding length of underhand, especially in ♂, in which the chelæ are not elongate .... *S. insculptus*, p. 68.
- *b*[1]. Upper and posterior crests upon hand and brachium distinctly, often coarsely granular.
  - *a*[3]. Length of underhand in ♀ about equal to width of hand; keel forming inner edge of upper surface of hand projecting so as to conceal upper crest on inner surface of hand .... *S. crassimanus*, p. 68.
  - *b*[3]. Length of underhand in both sexes much greater than width of hand; crest forming inner edge of upper surface weak and not projecting so as to conceal upper crest on inner surface of hand .. *S. leptochirus*, p. 69.

b. Brachium of chela armed in front at base with one or more, usually two, long sharp spiniform tubercles.
- *a*[4]. Tail almost four times (♀) or more than four times (♂) as long as the carapace; superior keels of segments 2–4 posteriorly depressed, not spiniform; brachial pores 7; vesicle, especially in ♂, large .... *S. petersii*, p. 70.
- *b*[4]. Tail shorter: superior keels of segments 2–4 or 3–4 posteriorly spiniform and, except in *S. asthenurus*, elevated; vesicle smaller; brachial pores not fewer than 9.
  - *a*[5]. Aculeus not defined at the base on each side by a semicircular groove; tail short and slender, with strongly spiniform superior keels; hands and carapace flatter; width of area on hand between finger-keel and inner edge not less in adult ♀ than half the movable finger .. *S. montanus*, p. 70.

b^6. Aculeus defined at base by a conspicuous semicircular groove; fingers longer, length of movable more than twice as great as width of area of upper hand between finger-keel and inner edge.

a^6. With only 3 large setal pores on underhand in addition to the two set transversely close to the base of the movable finger.

a^7. Superior keels on caudal segments 3-4 weakly spiniform and not elevated at their posterior ends; tail very short in ♂, segments 1-5 only twice as long as carapace, 1st segment not wider than humerus .... *S. asthenurus*, p. 73.

b^7. Superior keels on caudal segments 2-4 strongly spiniform and elevated posteriorly; caudal segments 1-5 in ♂ much more than twice the length of carapace; 1st caudal segment wider than width of humerus.

a^8. Brachial pores 9-10 or very rarely 11; fingers less strongly lobate in both sexes .... *S. longimanus*, p. 72.

b^8. Brachial pores 14-15; fingers more strongly lobate .... *S. binghamii*, p. 74.

b^6. With 9-10 large setal pores on underhand in adult in addition to the two near the base of the finger.

a^9. 1st caudal segment narrower than humerus; 15 setal pores on brachium; pectinal teeth 8 .... *S. lindstroemi*, p. 74.

b^9. 1st caudal segment wider than humerus; 19 setal pores on brachium; pectinal teeth 10-11 .... *S. anthracinus*, p. 74.

51. **Scorpiops hardwickii**, *Gervais in Walck. Ins. Apt.* iii. p. 66, 1844 (Scorpio); *Pocock, A. M. N. H.* (6) xii, p. 325, 1893; *Kraepelin, Jb. Hamb. wiss. Anst.* xi, p. 188, 1894; *id. Tierr., Scorp. etc.* p. 181, 1899 (Scorpiops): solidus, *Karsch, MT. Münch. ent. Ver.* iii. p. 106, 1879 (Scorpiops).

♀. *Colour* generally a tolerably uniform black, the underside and tips of legs paler; chelæ sometimes deep reddish. *Carapace* finely granular, a few coarser granules here and there, especially on the frontal lobes; as long as the 1st, 2nd, and half the 3rd caudal segments, considerably longer than the 5th. *Terga* coarsely granular, the granules often showing a tendency to fuse together into series; a median granular keel; last tergum more coarsely granular than the others, with median and two lateral crests. *Sterna* smooth, with a few large punctures; the last granular, with four subequal granular keels. *Tail* about three and a half times as long as carapace; 1st segment nearly twice as wide as long, 3rd as wide as

long, 5th twice as long as wide; intercarinal spaces granular; keels strong and subdenticulate, the upper keels of segments 2–4 not posteriorly enlarged and spiniform; *vesicle* finely granular, about as wide as the 5th caudal segment. *Chelæ* granular; humerus granular and granularly keeled above and below; upper side of brachium granular, bounded in front by a granular keel and behind by a strong smooth or almost smooth keel; a similar smooth crest running along the posterior surface, which is studded with a few large granules; anterior surface finely granular and armed with a pair of small widely-separated tubercles: lower side granular, bounded behind and in front by a granular crest, with a row of 7 setal pores along its hind border; hand thick, width nearly as great as length of underhand, with very strong and smooth finger-keel dividing its upper surface into an outer sub-vertical area and an inner horizontal area, both of them covered with granules showing a tendency to run into ridges and form an indistinct network; the outer area furnished in addition with a median smooth irregular subdivided crest; no distinct granular crest on the inner edge of the horizontal area; inner surface granular; underhand more finely granular and bounded externally by a smooth crest, furnished with a curved series of 3 large setal pores and 2 smaller, one between the 1st and 2nd, the other close to the keel beyond the 2nd, also 2 large setal pores set transversely close to the base of the finger; movable finger not lobate, scarcely exceeding underhand. *Pectinal teeth* 5–6; much larger in male.

♂ with tail, and especially chelæ, much longer than in female. *Tail* about four times as long as carapace. *Chelæ* elongate; brachium longer than carapace; width of hand distinctly less than length of underhand; the movable finger frequently without a lobe; when present, the lobe consists of a thick subtubercular prominence situated just behind the middle of the finger but well on the inner side of the median line of teeth; both movable and immovable digits are then lightly sinuate along the biting-edge. *Pectinal teeth* 5–6.

Measurements in mm:—

	Total length.	Carapace.	Tail.	Underhand.	Movable finger.	Width of hand.
♀	32	4·6	18	4	4·5	4
♂	33	5	20	5	5	4
♂	43	5·8	23	6	5·5	4·2

Loc. Western Himalayas: Kashmir (*Leach*); Jaunsár, 6000–9000 ft.; Dehra Dún, 2000 ft. (*Gamble & Smythies*); Kasauli (*Waller-Barrow*); Nepal (*Hardwicke*).

The measurements quoted above in the first and second lines are taken from the type (♀) specimen and another (♂) example, ticketed Nepal, from which Gervais drew up his description of the species. The measurements in the last line, showing the size to which the species may attain, are taken from an example from Jaunsár. The locality Nepal needs confirmation.

52. **Scorpiops insculptus**, n. sp.

♀. In size, colour, and most structural features resembling *S. hardwickii*. Upper side of trunk smoother, the granulation much less distinct, consisting of low, smooth, squamiform tubercles fusing and running into ridges to a much greater extent than in *S. hardwickii*, especially on the anterior terga. *Tail* granular and carinate as in the latter. *Chelæ* with humerus and brachium more coarsely granular above; the three posterior crests on the brachium quite smooth, as in *S. hardwickii*; 7 brachial pores and 3 normal pores on underhand; hand very wide, its width exceeding the length of the underhand and equal to the length of the movable finger; sculpturing on the upper side of the hand consisting of perfectly smooth, shining tubercles, forming in places an irregular network of ridges, but showing no separate tubercles and granules as in *S. hardwickii*; moreover, the inner horizontal area of the upper side of the hand is divided throughout by a smooth crest, which rises from the finger-keel near the base of the immovable finger and runs to the notch of the posterior border, where the expanded portion of the hand arises; underhand almost entirely smooth.

♂. Resembling the ♀ more than in the case of *S. hardwickii*; the hand of the *chelæ* not elongate as in the latter, but very broad, the width being equal to the movable finger and exceeding the length of the underhand; movable finger much more strongly curved than in *S. hardwickii*, its basal half with a deep and long excavation behind a low long lobe, which is situated in the distal half of the finger; immovable finger with large basal lobe, the rest of its biting-edge nearly straight, only lightly convex. *Pectinal teeth* 5–6 (♂, ♀).

Measurements in mm.—♂. Total length 35, carapace 5, tail 19, underhand 4, movable finger 4·5, width of hand 4·2.

♀. Total length 37, carapace 4·5, tail 20·5, underhand 3·6, movable finger 4, width of hand 4·3.

Loc. Western Himalayas: Jaunsár, 6000–9000 ft. (*Gamble & Smythies*); Dehra Dún, 2000 ft. (*Gleadow*).

53. **Scorpiops crassimanus**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 267, 1899.

♀. Allied to the preceding, but larger. *Colour* black, with reddish tinge on chelæ; median keel of terga yellowish anteriorly, and there is a transverse reddish stripe on each side in the middle of the terga. Upper side of *trunk* more finely granular than in *S. hardwickii*, crest on last tergum and sternum also weaker. *Tail* more powerful, about three and a half times as long as carapace, which is only a little longer than the 5th segment; intercarinal spaces of tail not so coarsely granular, and keels not so strongly denticulated, except the inferior laterals of the 5th, which are more sharply and coarsely denticulated; superior keels of 3rd and 4th

segments subspiniform distally. *Chelæ* (fig. 2 A, B, p. 7) with all the crests on the brachium and hand, which are smooth in *S. hardwickii*, very distinctly and coarsely granular; brachium and hand, moreover, much more closely granular, the granules more distinct and showing less tendency to run into ridges and networks; the crest forming the inner edge of the upper surface of the hand strong, consisting of a single row of coarse bead-like granules, and projecting as far inwards as the upper granular crest on the inner surface of the hand and practically concealing it from view when the hand is seen from above in the position of rest. *Pectinal teeth* 5–6.

Measurements in mm.—Total length 48, carapace 7·5, tail 28, width of hand 6, length of underhand 5·8, of movable finger 7.

Loc. Probably India: exact locality unknown.

54. **Scorpiops leptochirus**, *Pocock, A. M. N. H.* (6) xii, p. 325, pl. xiv. fig. 11; *id. A. M. N. H.* (6) xiii, p. 79, 1894; *Kraepelin, Tierr., Scorp. etc.* p. 181, 1899.

Resembling the preceding two species in having the brachium armed in front at the base with small granuliform tubercles, and approaching most nearly to *S. crassimanus* in size, granulation, strength of keels, &c.

♀. *Colour* black, tarsi and pectines yellow, vesicle and sterna reddish brown. *Carapace*, *terga*, and *tail* granular and carinate, practically as in *S. crassimanus*; last sternum with four distinctly granular keels; tail less than four times as long as the carapace, the superior keels of segments 2–4 subspiniform apically. *Chelæ* granular, practically as in *S. crassimanus*, but not quite so coarsely; inferior row of brachial pores 7; all the crests granular, as in that species, but the crests on the inner edge of the upper surface of the hand consisting of irregularly arranged granules, and not projecting as in *S. crassimanus*, but forming an obtuse angle with the upper area of the inner surface of the hand, so that when viewed from above the superior granular crest on the inner surface is plainly visible; hand much narrower than in *S. crassimanus*, its width much less than length of underhand and of movable finger, the two latter subequal but barely so long as the carapace; fingers without trace of lobation and sinuation; row of three pores on underhand.

♂. Resembling ♀ in general characters, but with the tail a little and the chelæ much longer. *Tail* about four times as long as carapace; *vesicle* a little larger than in ♀. Humerus as long as carapace; brachium a little, underhand much longer than carapace; width of hand equal to half the length of the underhand or a little more, the latter longer than the movable digit, which slightly exceeds the carapace and is without trace of lobe. *Pectinal teeth* 8–9.

Measurements in mm.—♀. Total length 58, carapace 7·5, tail 26, brachium 5·8, underhand 6·5, width of hand 4·8.

♂. Total length 55, carapace 7·6, tail 31, brachium 8, underhand 9, width of hand 4·8.

Loc. Assam: Tura in the Gáro Hills (*Long*); Sadiya.

55. **Scorpiops petersii**, *Pocock, A. M. N. H.* (6) xii, p. 323, pl. xiv, fig. 10, 1893; *Kraepelin, Jb. Hamb. wiss. Anst.* xi, p. 190, 1894; *id. Tierr., Scorp. etc.* p. 181, 1899: hardwickii, *Karsch, MT. Münch. ent. Ver.* iii, p. 106, 1879 (*not* hardwickii, *Gervais*).

♀. *Colour* of trunk and chelæ blackish, legs yellowish or reddish, vesicle and mandible yellow. Upper side of *trunk* granular and carinate, almost as in the preceding species; ocular tubercle smaller. *Tail* almost four times as long as carapace, thinner, 2nd segment longer than wide, 4th twice, 5th rather more than three times as long as wide; superior keels posteriorly depressed, not spiniform; *vesicle* large, its height equal to its width, its width equal to that of the 2nd segment of the tail. *Chelæ* granular; brachium shorter than carapace, with granular crests, its anterior surface armed basally with two strong spiniform teeth; 7 setal pores on lower side of brachium; crests on hand granular, the crests much stronger than in *S. leptochirus*, the granulation of the intercarinal spaces much weaker than in *S. crassimanus*; outer finger-keel on hand very strong; keel running along inner edge of upper side of hand also strong and beaded, but not projecting so far as the upper crest of the inner surface; underhand with curved series of 3 normal large setal pores and three smaller ones, one between 1st and 2nd and two beyond 2nd along inner edge of keel: width of hand about two-thirds the length of the underhand, the latter about as long as the movable finger and a little shorter than carapace; fingers strongly and mesially lobate and sinuate; 7 teeth on outer series as far back as lobe, 4 on inner series at distal end. *Pectinal teeth* 5–7.

♂. Not strikingly different from the ♀, except that the caudal vesicle is more inflated, the height and width being almost equal to width of 1st caudal segment, and the tail itself a little longer. Humerus, brachium, and underhand about as long as carapace. *Pectinal teeth* 6–7.

Measurements in mm.—♀. Total length 70, carapace 9·5, tail 36, underhand 9, width of hand 6.

♂. Total length 50, carapace 8, tail 36, underhand 8, width of hand 5·5.

Loc. Western Himalayas: Dehra Dún, 2000 ft.; Jaunsár, 6000–9000 ft. (*Gamble & Smythies*); Mussooree (*Rattray*); Simla.

56. **Scorpiops montanus**, *Karsch, MT. Münch. ent. Ver.* iii, p. 107, 1879; *Kraepelin, Jb. Hamb. wiss. Anst.* xi, p. 192, 1894, and *Tierr., Scorp. etc.* p. 180, 1899 (in part and excluding synonymy).

♀. *Colour* as in *S. petersii*; carapace flatter than in that species,

the groove shallower, as long as the first three segments of the tail or as the 3rd and 4th, very much longer than the 5th. Last abdominal *sternum* with obsolete median keels. *Tail* very short and slender, width of 1st segment less than that of humerus, considerably less than three times as long as the carapace, 2nd segment about as wide as long, 4th one-third longer than wide, 5th about three times as long as wide ; inferior keels of 1st and 2nd scarcely granular ; superior keels of 2nd, 3rd, and 4th posteriorly elevated and strongly spiniform ; *vesicle* compressed, slightly higher than wide, as wide as the 5th segment, without an annular constriction at base of aculeus. *Chelæ* and especially the hand lower, more depressed than in *S. petersii* and the foregoing species ; the crests strong and granular ; brachium with two basal teeth, the inferior frequently much the larger of the two ; brachium shorter, underhand a little longer than carapace, the former furnished below with about 15 pores, the hand with four, one of which is smaller than the others ; hand narrow, its width barely two-thirds the length of the underhand ; movable finger shorter than underhand and only twice the length of the area between the upper keels of the hand, lobate in the basal half, but not so strongly as in *S. petersii*. *Pectinal teeth* 6–7.

♂. With much longer chelæ and a slightly longer tail than in female. *Tail* about three times as long as the carapace, which is slightly shorter than the 4th and 5th segments, and barely as long as the 5th and half the vesicle. Humerus a little longer than carapace, brachium scarcely so long ; underhand longer, sometimes much longer and twice as long as width of hand ; movable digit as long as carapace, more strongly lobate than in female. *Pectinal teeth* 8.

Measurements in mm.—♀. Total length 56, carapace 8·5, tail 23, underhand 9, width of hand 5.

♂. Total length 51, carapace 9, tail 27, underhand 11, width of hand 5·2.

Loc. Western Himalayas : Jaunsár, 6000–9000 ft. (*Gamble & Smythies*) ; Dehra Dún, 2000 ft. (*Gamble, Smythies, & Gleadow*) ; Kasauli (*Waller-Barrow*) ; Dharmsála (*Fulton*).

Subspecies **satarensis**, nov.

♀. Resembling the typical form in size and colour, but very much smoother, the carapace and terga being at most finely granular, leaving the median keel and area of the posterior border immediately behind it smooth ; in some cases the terga are finely granulated only at the sides, smooth and punctured elsewhere. The chelæ, too, are much less coarsely granular both on the keels and on the intercarinal spaces ; digits very slightly lobate.

Sexual features of male much less developed than in typical form ; humerus about as long as carapace, underhand only a little longer and less than twice the width of the hand. Brachial pores 13–14.

Measurements in mm.—♀. Total length 60, carapace 8·3, tail 23, underhand 9, width of hand 5·8.

♂. Total length 57, carapace 8, tail 24, underhand 8·5, width of hand 5·3.

Loc. Mahableshwar, Satára district (*Wroughton*).

Subspecies **tenuicauda**, *Pocock, A. M. N. H.* (6) xiii, p. 77, 1894; *Kraep. Tierr., Scorp. etc.* p. 181, 1899.

Differing from the preceding subspecies as well as from the principal form in being very much smaller and in having the legs, with the exception of the tarsi, which are yellow, fuscous instead of yellowish red. *Terga* smooth mesially in ♀, as in *S. satarensis*; finely granular in ♂. *Chelæ* in ♀ with fingers scarcely noticeably lobate; chelæ in ♂ very long and slender, being even more modified than in the typical form of the species; fingers strongly lobate. Brachial pores 12–13.

Measurements in mm.—♀. Total length 36, carapace 6, tail 16, underhand 6·8, width of hand 4.

♂. Total length 38, carapace 5·8, tail 17·5, underhand 7·2, width of hand 3.

Loc. The Deccan.

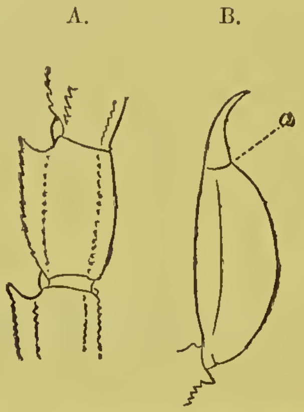


Fig. 20.—A. 4th with parts of 3rd and 5th caudal segments of *Scorpiops longimanus*.
B. Vesicle of tail of ditto, showing annular groove (*a*) at base of aculeus.

57. **Scorpiops longimanus**, *Pocock, A. M. N. H.* (6) xii, p. 326, pl. xiv, fig. 12, 1893; *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 191, 1894; *id. Tierr., Scorp. etc.* p. 180, 1899.

♀. *Colour* entirely black on the dorsal surface and tail. *Carapace* not so depressed as in *S. montanus* and with deeper grooves, not so long as the first three caudal segments, considerably shorter than the 4th and 5th, and less than the 5th and half the vesicle. *Tail*

thicker and longer than in *S. montanus*, about three times as long as the carapace, 1st segment at least as wide as the humerus; keels and granulation as in *S. montanus*; *vesicle* as in that species, but with a distinct semicircular sulcus at the base of the aculeus on each side. *Chelæ* more resembling those of *S. leptochirus* than those of *S. montanus*, except for two spiniform teeth on the brachium; brachium shorter than carapace, with inferior rows of 9–10 (in one case 11) setal pores, 9 commonly occurring in young; the crests weaker and the area at the base of the anterior spines not so prominent; *hand* constantly with only three pores in a curved series below, all its crests much weaker than in *S. montanus*, width of its dorsal area between the keels much less than half the movable finger; the underhand almost twice the width of the hand, but not quite so long as the movable finger, which is at least as long as the carapace, but is scarcely noticeably lobate, outer row of supernumerary teeth, as far back as lobe, 12, inner row 6. Granular crests on under side of *femora* of legs weaker than in *S. montanus*. *Pectinal teeth* 6–8.

♂. Very like the female; *tail* scarcely if at all longer; *chelæ* a little longer, hand thicker, and fingers lobate; underhand a little longer than carapace and longer than movable finger, which is about equal to carapace.

Measurements in mm.— ♀. Total length 51, carapace 7·5, tail 25, underhand 7·5, movable finger 8, width of hand 4.

♂. Total length 47, carapace 7·5, tail 26·5, underhand 8·2, movable finger 7·6, width of hand 4·8.

Loc. Assam. Sylhet; Dhubri (*Smart*); North Cachar Hills; Sadiya; Nága Hills.

This species was based upon a single female example from Sylhet. The measurements given above are taken from an adult male and female of the same species from Dhubri. These specimens are smaller than the type and than most of the adult examples that have come to hand.

58. **Scorpiops asthenurus**, sp. n.

♂. Belonging to the same category of species as *S. longimanus*, which it resembles in colour, sculpturing, &c. The *tail*, however, is shorter and weaker, being only about twice as long as the carapace, which is almost as long as its first three segments or as the 4th and 5th; dorsal keels of the 3rd and 4th weakly spiniform, but not elevated, being lightly depressed at the posterior end; 1st segment only as wide as the brachium; a distinct annuliform sulcus at base of aculeus. *Chelæ* as in *S. longimanus*; brachial pores 9; hand much wider than in *S. longimanus*, its inner edge more strongly convex, its width more than half the length of the underhand; area between the keels of its dorsal surface less than half the length of the movable finger, which is not quite equal to the underhand or to the carapace; outer edge of finger not evenly curved, but showing a slight bend just on a level with the lobe;

lobe large; notch on immovable finger correspondingly deep, but when closed a very distinct nearly sigmoidal space is left between the bases of the fingers; 3 large setal pores on underside of hand, in addition to the invariable pair near base of finger. *Pectinal teeth* 6.

Measurements in mm.—Total length 35, carapace 5, tail 17, underhand 6, movable finger 5·5, width of hand 3·5.

Loc. Kalimpong near Darjiling (*Stebbing*).

59. **Scorpiops binghamii**, *Pocock, A. M. N. H.* (6) xii, p. 327, pl. xiv, fig. 13, 1893.

Very closely allied to the Assamese *S. longimanus*, but differing in having 14–15 setal pores on the underside of the brachium, and the hands more distinctly lobate both in ♂ and ♀.

Measurements in mm.—♀. Total length 60, carapace 9·8, tail 31, underhand 9·5, movable finger 9, width of hand 4·8.

♂. Total length 55, carapace 8, tail 27, underhand 9, movable finger 7, width of hand 5.

Loc. Lower Burma: Pegu Hills and Central Tenasserim (*Bingham*).

60. **Scorpiops anthracinus**, *Simon, J. A. S. B.* lvi, p. 112, 1887.

♀. Allied to the two preceding species, but easily recognizable from both by the extreme slenderness of the hand and by the larger number of setal pores upon the lower side of the brachium and hand. Brachial pores 19; a curved row of 10 pores on underhand. *Hand* very slender, its inner and outer edges nearly straight and parallel, its width less than half the length of the underhand, the width of its dorsal area between inner keel and the finger-keel less than one-third the length of the movable finger and less than width of humerus; movable finger equal to the carapace and slightly exceeding the underhand. *Pectinal teeth* 10–11. Upper crests of *tail* more elevated and spiniform than in the other species.

Measurements in mm.—♀. Total length 57, carapace 8·5, tail 27, underhand 7·5, movable finger 8·5, width of hand 3·5.

Loc. Tavoy in Tenasserim.

61. **Scorpiops lindstroemii**, *Thorell, Ann. Mus. Genova*, xxvii, p. 573, 1889: lugubris, *id. ibid.* p. 579.

♀. Resembling *S. anthracinus* in having a row of 9–10 setal pores on the underhand in the adult, but differing principally in having only 15 instead of 19 brachial pores, and the chelæ both longer and stouter, &c. Dorsal crests on tail with terminal spine not so strong as in *S. anthracinus*; 1st segment narrower than

humerus, only as wide as the intercarinal area of its upper surface. *Chelæ* with humerus as long as carapace; width of hand almost half the length of the underhand, which is as long as the movable finger and longer than the carapace; width of dorsal area of hand between the keels about one-third the length of the movable finger: finger more strongly lobate than in *S. anthracinus*. *Pectinal teeth* 8.

Measurements in mm. of type.—Total length 68, carapace 12, tail 37, humerus 12·3, underhand 13, movable finger 13, width of hand 6·5, of its dorsal intercarinal area 4·2.

Loc. Mt. Mooleyit in Tenasserim (*Fea*), also the North Chin Hills in Upper Burma (*Watson*).

Scorpiops lugubris, Thorell (Ann. Mus. Genova, xxvii, p. 579), was based upon an immature specimen of the genus from the same locality as the type of *S. lindstroemii*. In all probability it is the young of that species. It has 7 pores on the lower side of the hand. An immature specimen from the North Chin Hills in Upper Burma closely resembles the type of *S. lugubris*.

The following species, which I have not seen, has been omitted from the table:—

62. **Scorpiops affinis**, *Kraep. Jb. Hamb. wiss. Anst.* xv, p. 44, 1898; *id. Tierr., Scorp. etc.* p. 182, 1899.

"Resembling *Sc. hardwickii* in size, colour, &c., but with the keels of the chelæ granular. Hand with finger-keel and keel of underhand coarsely granular; inner border not limited throughout by a smooth keel, but marked with a row of stronger granules; inner horizontal portion of upper side of hand covered with numerous isolated rounded granules like those of the outer surface. Fourth abdominal sternum coarsely punctured, almost as in a thimble. Pectinal teeth 5–7.

"*Loc.* Himalaya."

This species is evidently nearly related to *S. crassimanus*, and according to the characters cited should fall under heading a^3 of the synopsis. Nothing, however, is said respecting the prominence of the inner edge on the upper surface of the hand. *Sc. crassimanus*, moreover, is a larger species than *S. hardwickii*, and the 4th abdominal sternum is not punctured in the way described as characteristic of *S. affinis*. Hence the two species must for the present be regarded as distinct.

Family ISCHNURIDÆ.

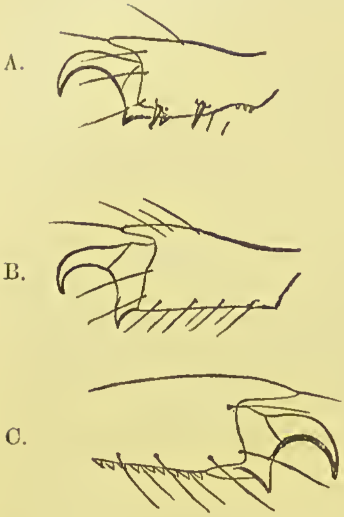


Fig. 21.—A. *Chiromachetes fergusoni*, tarsus of 4th leg, external view. B. *Hormurus australasiæ*, ditto. C. *Iomachus læviceps*, ditto.

Legs furnished with a single pedal spur. *Sternum* broad and pentagonal. *Genital operculum* divided in male, undivided in female. Both movable and immovable fingers of *mandible* untoothed along the lower edge. No spine beneath aculeus on *vesicle* of tail. Extremity of *tarsi* squarely truncate, forming almost a right angle with the base of the claw-lobe, and not produced into a rounded lobe overlapping the claws at the side. *Carapace*, *abdomen*, and *chelæ* flat and depressed; hand with strong and complete finger-keel; edges of finger of chela granularly dentate, not produced into sharp triangular teeth. *Tail* thin, strongly compressed.

Distribution. Ethiopian Region; Madagascar; Oriental Region from India to Papua; northern part of Neotropical Region.

Synopsis of Indian Genera.

a. A single median keel on the lower side of all the caudal segments, that on the 1st sometimes obsolete; tarsi armed beneath and distally with many (5 pairs of) spines .... HEMISCORPIUS, p. 77.

b. No median keel on the under side of caudal segments 1–4; tarsi furnished below with paired setæ or at most a few spines, 2 distal and 1 proximal.

  *a*¹. Median eyes well in front of the middle of the carapace; tarsi spined beneath, protarsi spined at the distal end...... CHIROMACHETES, p. 77.

  *b*¹. Median eyes only just in front of the middle of the carapace; protarsi not distally spined; tarsi at most with one posterior distal spine.

    *a*². Tarsi with median row of spicules; posterior lateral eye above edge of carapace .... IOMACHUS, p. 81.

    *b*². Tarsi without median row of spicules; all three lateral eyes on edge of carapace .... HORMURUS, p. 78.

Genus HEMISCORPIUS, Peters.

Hemiscorpius, *Peters, MB. Akad. Berlin*, 1861, p. 426 (April); *Pocock, A. M. N. H.* (6) xii, p. 308, 1893.
Hemiscorpion, *Peters, MB. Akad. Berlin*, 1861, p. 511 (May); *Karsch, MT. Münch. ent. Ver.* iii, p. 15, 1879; *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 110, 1894; *id. Tierr., Scorp. etc.* p. 142, 1899.

Carapace with median eyes in advance of the middle of the plate. *Tarsi* (fig. 5 A, p. 8) armed beneath and on each side of the distal extremity with many pairs of long and slender spines, and furnished with median row of spicules. *Sternum* elongate, parallel-sided, with deep median groove. Finger of *chela* with two parallel rows of teeth and externally with some larger teeth.

Type, *H. lepturus*, Peters.

Distribution. S. Arabia; Socotra; Baghdad and Baluchistan.

63. **Hemiscorpius lepturus**, *Peters, MB. Akad. Berlin*, 1861, p. 426, figs. 1–8; *id. op. cit.* p. 511 (Hemiscorpion); *Kraep. Jb. Hamb. Wiss. Anst.* xi, p. 111, t. ii, figs. 39, 40, 1894; *id. Tierr., Scorp. etc.* p. 142, fig. 38, 1899.

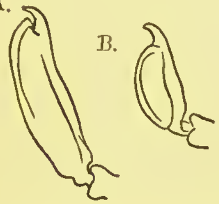


Fig. 22.—*Hemiscorpius lepturus.* A. Vesicle and aculeus of ♂. B. Do. of ♀.

♀. *Colour* uniform yellowish red, with browner fingers. *Carapace* and abdomen smooth to finely punctured. Keels of *tail* smooth or finely granular. *Vesicle* of normal form, not globular, with short and thick aculeus. Hand with nearly smooth finger-keel, its upper surface reticulated. *Pectinal teeth* 9. Total length 45 mm.

♂. Differing from ♀ in having carapace and abdomen finely granular or rugulose; tail very long and slender; vesicle very long, with blunt tuberculiform projection on each side at the base of the aculeus. *Pectinal teeth* 15–16. Total length 66 mm.

Distribution. Baghdad (*Petermann*); Northern Baluchistan (*Maynard & MacMahon*). The example from Baluchistan has lost its tail, and is identified as *H. lepturus* with some hesitation.

Genus CHIROMACHETES, Pocock.

Chiromachetes, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 744, 1899.

Carapace with anterior border deeply excised in middle line; median *eyes* well in advance of the centre, the distance between them and the posterior margin nearly twice as great as the distance between them and the median excision; lateral eyes almost marginal, the anterior two separated by a very narrow space from the subjacent edge, the posterior practically on the edge. Extremity of *protarsi* spined; *tarsi* (fig. 21, A) armed below with a few spines, without median row of spicules except quite at base. Digit of

chela armed with two rows of teeth; brachium with large basal prominence.

Type, *C. fergusoni*, Pocock.

Distribution. Malabar coast, S. India.

Resembling the S. African and Neotropical genus *Opisthacanthus* in the spine-armature of its legs, except that the spines on the tarsi are fewer than in any known species of that genus. Further and especially differing in the forward position of the median eyes and the closeness of the lateral eyes to the margin, these eyes in *Opisthacanthus*, especially the posterior, being distinctly above the edge.

64. **Chiromachetes fergusoni**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 744, 1899.

Colour: upper side of body and tail blackish green, vesicle clear yellow; legs and chelæ blackish brown; tarsi yellow. *Carapace* and *terga* densely and finely punctured, without granules and without crests, except for the normal median low elevation on the terga; carapace a little longer than the 1st and 2nd caudal segments, shorter than the 4th and 5th. *Tail* about four times as long as carapace, densely punctured, smooth, except for a few granules on the lower side of the 4th and 5th segments; without keels; the 1st, 2nd, and 3rd segments posteriorly elevated on each side of the dorsal groove; segments impressed with serially arranged setiferous pores; *vesicle* compressed, thickly covered with long bristles below. *Chelæ* large, densely punctured, finely granular above, smooth below; both humerus and brachium longer than carapace; humerus and brachium with posterior side somewhat compressed, coarsely denticulate, but scarcely carinate; hand with finger-keel, underhand-keel, and area between them coarsely granular; underhand much longer than carapace, not twice as long as the width of the hand, longer than movable finger, which is strongly lobate, the immovable correspondingly notched; movable finger longer than carapace. *Legs* finely punctured; femora finely granular externally; protarsi with finely serrulate external edge, armed with 3 spines on the inner side at apex. *Pectinal teeth* 7–8.

Measurements in mm.—Total length 100, carapace 14, tail 44, underhand 18, movable finger 15, width of hand 10.

Loc. Trivandrum in Travancore (*Ferguson*).

Genus HORMURUS, Thorell.

Hormurus, *Thorell, A. M. N. H.* (4) xvii, p. 14, 1876; *Pocock, A. M. N. H.* (6) xii, p. 320, t. xiv, fig. 6, 1893; *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 131, 1894; *id. Tierr., Scorp. etc.* p. 153, 1899.

Carapace with median eyes near the centre, and the three lateral eyes on the very edge. *Tarsi* (fig. 21, B) furnished beneath with four pairs of moderately long stiff bristles, not with spines, and without a median line of spicules; extremity of protarsi also bristly

and not spined. Movable finger of *chela* with two parallel rows of teeth. *Genital operculum* of female not narrowed and pointed behind; marked with median suture.

Type, *H. australasiæ* (Fabr.).

Distribution. India, Burma, and the whole of the Indo- and Austro-Malayan area as far as Fiji.

Synopsis of Indian Species.

a. Upper and lower crests on posterior side of brachium granular; sterna thickly punctured; tail laterally granular .... *H. australasiæ*, p. 79.

b. Lower crest on posterior side of brachium quite smooth; sterna not or scarcely punctured; sides of tail not granular .... *H. nigripes*, p. 80.

65. **Hormurus australasiæ**, *Fabr. Syst. Ent.* p. 399, 1775 (Scorpio); *C. L. Koch, Arachn.* iv, p. 71, fig. 294, 1838 (Ischnurus); *Thorell, Atti Soc. Ital.* xix, p. 251, 1876; *Simon, J. A. S. B.* lvi, p. 113, 1887 (Liocheles); *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 133, 1894; *id. Tierr., Scorp. etc.* p. 154, 1899.

Ischnurus complanatus, *C. Koch, Arachn.* iv, p. 73, fig. 295, 1838; *Thorell, Ann. Mus. Genova,* xxvi, p. 420, 1888.

Colour of upper side of trunk, chelæ, and of tail reddish or greenish brown; under side of trunk paler; vesicle clear yellow or yellowish red, paler than the dorsal surface of the abdomen. *Carapace* and *terga* densely and finely punctured in ♀, sometimes granular laterally in ♂. *Sterna* finely punctured. *Tail* at most only about two and a half times as long as the carapace, weakly granular below, above, and at the sides; dorsal keels practically absent, but the extremities of the upper sides of segments 2–4 provided with a pointed upstanding tubercle; inferior crests of 3rd and 4th weakly granular, of 1st bearing posteriorly a pair of sharp downwardly and backwardly directed tubercles, similar tubercles on inferior median and lateral keels of 2nd; inferior lateral keels of the 5th denticulate; *vesicle* finely punctured and pitted, like the lower side of the tail, with setiferous pores. *Chelæ* massive, granular and punctured above, punctured below; anterior side finely granular; the keels strong and coarsely granular; base of the brachium in front elevated into a ridge bearing a pair of larger denticles; brachium shorter than carapace; underhand longer than carapace, not twice as long as the width of the hand; area below finger-keel coarsely granular; basal half of fingers granular; finger-keel and keel of underhand strong and coarsely granular; fingers short, about two-thirds the length of the underhand, shorter than carapace, not lobate in females and young males, but strongly lobate in large males. *Legs* externally finely granular, with under edge of femora and patellæ serrate. *Pectinal teeth* 5–8, mostly 6–7.

Measurements in mm. of adult ♂.—Total length 37, carapace 7, tail 18, underhand 8, movable finger 6, width of hand 5.

Loc. Burma: Akyab; Myanyoung, Moulmein; Kawkareik, Thagata-juva, and Mount Mooleyit, in Tenasserim; Tavoy and Reef Island (*Fea & Oates*); Great Cocos Island, Andamans (*Oates*); Nicobar Islands, thence over the whole of the Indo-Malayan and Austro-Malayan area.

Adults of this species vary much in size, some males with fully-developed sexual features being only about 30 mm., the carapace measuring 5, and the adult females may reach 45 mm. or more.

Subspecies **suspectus**, *Thorell*: Hormurus australasiæ, *Fabr.*, var. γ. suspectus, *Thorell, Ann. Mus. Genova,* xxvi, pp. 420 & 422, 1888.

Differs from the Burmese representative of the typical form in having the upper side of the trunk and the tail, with exception of the yellowish-red vesicle, a deep greenish black, the chelæ being of much the same colour, and the legs, although ferruginous towards the extremities, are piceous and not paler than the upper side of the trunk. Total length of adult ♂ 42 mm.

Loc. Lower Burma: Prome (*Fea*) and the Pegu Hills (*Bingham*).

The granulation of the carapace and terga, which Thorell relied upon as a basis for this form, is not more strongly developed than in many males of the typical form.

66. **Hormurus nigripes,** *Pocock, Jour. Bom. N. H. Soc.* xi, p. 117, 1897; *Kraepelin, Tierr., Scorp. etc.* p. 155, 1899.

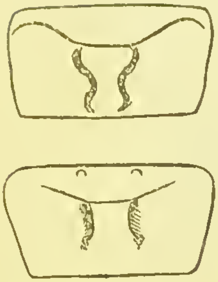
Colour a shining pitchy brown, only the vesicle yellow; legs as dark as the body, with the exception of the tarsi which are yellow. *Carapace* smooth and punctured as in *H. australasiæ*, but with the frontal border more deeply excavated and the frontal lobes more square. *Terga* much less conspicuously punctulate than in *H. australasiæ*; *sterna* also scarcely noticeably punctulate. *Tail* of about the same strength and with the same armature of dentiform tubercles as in *H. australasiæ*, but the segments are very noticeably shorter as compared to their length, and with the exception of the above-mentioned sharp tubercles are entirely without granules. *Chelæ* as large as in *H. australasiæ*; humerus with granules and tubercles weaker; the upper surface of brachium smooth and punctured, crests of its posterior surface almost or quite smooth, the edge of the anterior basal prominence not produced into a crest bearing spiniform tubercles; hand punctulate and granulate as in *H. australasiæ*, but with its posterior external angle projecting much more strongly, and the area opposed to the brachium prolonged internally so that when closed it overlaps the basal prominence of the brachium; in *H. australasiæ* it falls short of the prominence, the teeth of which abut against the inner edge of the hand. *Pectinal teeth* 6 in ♀.

Measurements in mm.—Total length 35, of tail 14, carapace 6·3, underhand 6, movable finger 4·2, width of hand 3·8.

Loc. India: Pánch Máháls in Guzerat (*Wallinger*); Satna in Central Provinces (*Dane*).

Genus IOMACHUS, Pocock.

Iomachus, *Pocock, A. M. N. H.* (6) xii, p. 320, 1893; *id. op. cit.* (6) xvii, p. 317, 1896; *Kraepelin, Jb. Hamb. wiss. Anst.* xi, p. 139, 1894; *id. Tierr., Scorp. etc.* p. 155, 1899.



A. B.

Fig. 23. — A. *Iomachus læviceps*, 4th tergal plate of abdomen. B. *Iomachus nitidus*, ditto.

Nearly allied to *Hormurus*, but with the posterior lateral eye above the margin of the carapace, the tarsi furnished beneath with a median row of spicules and with a few long slender bristles at the sides; and the genital operculum of the female pointed posteriorly and without trace of a median suture.

Type, *I. læviceps* (Pocock).

Distribution. Southern India; British and German East Africa.

Synopsis of Indian Species.

a. Abdominal terga not visibly punctured, marked with a pair of short pits scarcely surpassing the middle of the terga .... *I. nitidus*, p. 83.

b. Abdominal terga visibly punctured, especially laterally, marked with a pair of strong sigmoid grooves which extend almost to the posterior margin.

- *a*[1]. Two setal pores on base of immovable finger above; tarsi with two pairs of bristles below .... *I. læviceps*, p. 81.
- *b*[1]. Three setal pores on base of immovable finger above; a spine on posterior distal angle of tarsus below .... *I. punctulatus*, p. 83.

67. **Iomachus læviceps**, *Pocock, A. M. N. H.* (6) v, p. 242, t. xii, figs. 1–1 *a*, 1890; *id. Jour. Bom. N. H. Soc.* vii, p. 303, 1893 (Hormurus); *Pocock, A. M. N. H.* (6) xii, p. 320, t. xiv, f. 5, 1893; *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 139 (1894); *Pocock, Jour. Bom. N. H. Soc.* xi, p. 116, 1897; *Kraep. Tierr., Scorp. etc.* p. 156, 1899 (Iomachus).

Colour: body and tail yellowish or reddish to almost blackish brown above; chelæ redder; legs reddish or yellowish brown, always paler than the body; vesicle clear yellowish red. *Carapace* and *terga* closely and finely punctured throughout, sometimes very finely granular laterally; carapace a little longer than 1st and 2nd caudal segments; about as long as 4th and 5th in ♀, shorter in ♂. *Sterna* very faintly and closely punctured. *Tail* barely

three times as long as carapace in ♀, rather longer in ♂; scarcely granular, and except the 5th segment, non-carinate. *Chelæ* finely punctured throughout, scarcely granular above; humerus and brachium subequal and about as long as carapace; brachium armed in front at base with a low subbifid prominence; hand at most

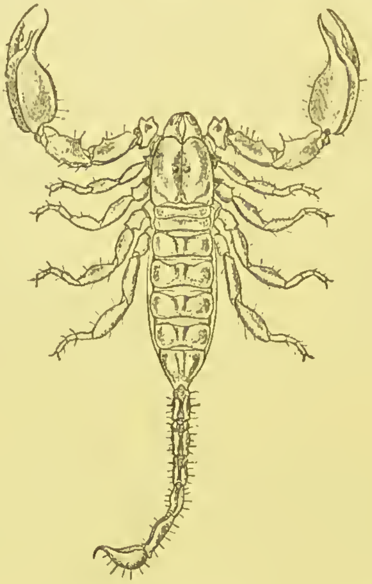


Fig. 24.—*Iomachus læviceps*, ♂. Nat. size.

subrugulose above, its external portion coarsely granular; finger-keel strong, almost smooth, keel of underhand more granular; underhand a little longer than carapace, longer than width of hand by one-fourth (♀) or about one-third (♂) of its length; movable finger a little shorter than carapace, weakly lobate in ♀ and young ♂, strongly lobate in adult ♂. Two setal pores on upper side of immovable finger. *Pectinal teeth* 3–6, usually 5.

Measurements in mm. of ♂.—Total length 55, carapace 8, tail 25, underhand 9, movable finger 7, width of hand 5·5.

Loc. S. India: Yercaud in Shevaroy Hills (*Henderson*); Kotagiri, Nilgiri Hills (*Henderson & Daly*).

Subspecies **malabarensis**, nov.

A dark form, differing from the typical form of *læviceps* in having the chelæ black and the legs a deep blackish brown, and the movable finger of the chelæ both in male and female much more strongly lobate, and the immovable correspondingly deeply notched.

Loc. Mangalore on the Malabar coast (*Battie*).

68. **Iomachus punctulatus**, *Pocock, Jour. Bom. N. H. Soc.* xi, p. 116, 1897; *Kraep. Tierr., Scorp. etc.* p. 156, 1899.

♂. Closely allied to the preceding. *Trunk, limbs*, and *tail* black or reddish black, legs not lighter than body. *Tail* three and a half times the length of the carapace, which is as long as its 1st and 2nd segments. *Chelæ* longer than in *I. læviceps*, the movable finger quite as long as the carapace, and only slightly shorter than the underhand; process at base of brachium smaller than in *I. læviceps*. Base of finger on upper side with three setal pores, the first of small size, the others larger and situated farther along the finger. Distal bristle on the posterior side of tarsus replaced by a spine.

♀. Chelæ and tail shorter than in ♂; tail about three times as long as the carapace, which equals its first two segments and half the third. *Pectinal teeth* 5.

Measurements in mm. (♂).—Total length 62, carapace 8, tail 30, underhand 8·5, movable finger 8, width of hand 5·8.

Loc. S. India: Coimbatore (*Davison*); Nilgiri Hills (*Daly*).

69. **Iomachus nitidus**, sp. n.

Colour: legs, chelæ, tail, with exception of the reddish-yellow vesicle, and upper side of body black. *Carapace* very finely punctured at the sides and in the depression surrounding the median eyes, the rest of its median area smooth and not or scarcely visibly punctulate. *Terga* smooth, not visibly punctulate, marked in the anterior half with a pair of deep longitudinal pits, which, however, are not or scarcely prolonged posteriorly beyond the middle of the plate, and do not present the sigmoid shape and the median piriform area so noticeable in *I. læviceps* and *punctulatus*. Moreover, the anterior portion of the terga in front of the impression presents no strong transverse sinuous groove running from side to side as in *I. læviceps* and *punctulatus*, this groove being moderately deep only in the middle between the anterior ends of the impressions and becoming obsolete at the sides. *Sterna* also smooth, not visibly punctured. *Tail* as in *I. læviceps*, but with the 4th and 5th segments finely granular dorsally. *Chelæ* punctured and carinate as in *I. læviceps*; two setal pores on base of immovable finger above as in that species. *Tarsi* furnished below with setæ as in *I. læviceps*. *Pectinal teeth* 5. Total length 45 mm.

Loc. Southern India: Nellore (*Popert*).

Family SCORPIONIDÆ.

(=Scorpionidæ, subfam. Scorpionini, *Pocock, A. M. N. H.* (6) xii, p. 306, 1893; *Kraep. Tierr., Scorp.* p. 106, 1899.)

Differing from the *Ischnuridæ* in having the tarsi produced distally on each side into a large lobe overlapping the base of the claw and forming a very acute angle with the base of the claw-lobe (fig. 4 B, p. 8). Body and chelæ not flat and depressed; hand usually convex above, the finger-keel absent, or not so strong and complete as in the *Ischnuridæ*; fingers armed with strong triangularly pointed teeth. *Tail* powerful, not compressed.

Distribution. Ethiopian Region; Oriental Region from India to Borneo.

Genus **PALAMNÆUS**, Thorell.

Palamnæus, *Thorell, A. M. N. H.* (4) xvii, p. 13, 1876 (in part); *Pocock, A. M. N. H.* (6) xviii, p. 77, 1896 (sensu stricto).
Pandinus, *Thorell, Atti Soc. It.* xix, p. 199, 1877 (in part).
Scorpio, *Pocock, Jour. Bom. N. H. Soc.* vii, p. 309, 1893; *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 28, 1894 (in part).
Heterometrus, *Hemp. & Ehrenb. Symb. Phys., Scorp.* p. 2, 1829 (in part); *Simon, Rev. et Mag. Zool.* (2) xxiii, p. 56, 1872 (in part); *Kraep. Tierr., Scorp. etc.* p. 107, 1899 (sensu stricto).

Carapace deeply notched in the middle line; median eyes close to the centre. *Tarsal lobes* of 3rd and 4th legs with 2, very rarely 3 spines. Brachium of chela with its underside posteriorly rounded, not or scarcely keeled, and furnished with only a few setiferous pores. A stridulating organ situated between the chela and the first leg, consisting of a series of granules forming a rasp upon the coxa of the 1st leg, and a cluster of vibrating bristles upon the coxa (maxilla) of the chela.

Type, *P. petersii*, Thor. (=*silenus*, Sim.).

Distribution. Oriental Region from India and Ceylon to Borneo and the Philippines.

Synopsis of Indian Species.

a. Inner edge of hand scarcely compressed, rounder and thicker; large spiniform tubercle at base of brachium in front.
  *a*¹. Inner edge of hand beset with low moderately sharp or blunt tubercles; chela of ♂ much longer than of ♀, the hand very narrow and long . . . . *P. longimanus*, [p. 97.
  *b*¹. Inner edge of hand beset with strong, spiniform tubercles; chelæ in ♂ approximately like those of ♀, the hand short and thick . . . . . . *P. oatesii*, p. 98.
b. Inner edge of hand compressed; no large spiniform tubercle at base of brachium in front.

a^2. Humerus of chela coarsely granular on the underside at base; 5th caudal segment not shorter than carapace .... *P. swammerdami*, [p. 86.

b^2. Humerus smooth below, or with only a few granules; 5th caudal segment much shorter than carapace.

a^3. Tarsal lobes armed each with 3 spines, 1 at the apex above and 2 below .... *P. latimanus*, [p. 90.

b^3. Tarsal lobes armed with 2 spines each, the apex not spined, tipped with bristles.

a^4. Lower side of vesicle perfectly smooth and polished, hairy and punctured .. *P. liurus*, p. 91.

b^4. Vesicle furnished below with at least four rows of sharp tubercles.

a^5. Inner edge of hand not beset with sharp tooth-like tubercles, crested at base of finger; upper surface with four low longitudinal crests ...... *P. gravimanus*, [p. 90.

b^5. Inner edge of hand studded with sharp denticles, not crested at base of finger; tubercles of the dorsal side not running into four distinct longitudinal crests.

a^6. Outer portion of upper surface of hand defined above by a distinct but irregular ridge or crest.

a^7. Legs reddish yellow .... *P. fulvipes*, p. 87.

b^7. Legs deep blackish brown .... *P. wroughtoni*, [p. 89.

b^6. Outer portion of upper side of hand not defined above by a longitudinal ridge.

a^8. Length of adult only about 75 mm.; legs reddish yellow as in *fulvipes* .... *P. xanthopus*, [p. 92.

b^8. Length of adult not less than 100 mm.; legs coloured like trunk, generally nearly black.

a^9. Hand exceedingly smooth above; terga with three posterior tubercles .... *P. scaber*, p. 93.

b^9. Hand rugose or tubercular; terga not tubercular.

a^{10}. Hands orange-yellow; rest of chelæ, body and legs black. *P. barberi*, p. 95.

b^{10}. Hands much the same colour as rest of chelæ

a^{11}. Hands narrow, smooth, covered above with sculpturing of reticulated ridges. *P. bengalensis*, [p. 94.

b^{11}. Hands broad, covered above with large tubercles or coarsely reticulated.

a^{12}. Last abdominal sternum without four low crests, densely punctured; basal portion of pecten broad, its angle less obtuse .... *P. phipsoni*, p. 94.

b^{12}. Last abdominal sternum with four low crests; not visibly punctured; basal portion of pecten very narrow.
a^{13}. Frontal lobes of carapace and underhand thickly granular .. .. *P. cæsar*, p. 97.
b^{13}. Frontal lobes of carapace and underhand not conspicuously granular.
a^{14}. Inner border of hand widely rounded from base of immovable finger; upper keels of tail strongly denticulated. *P. serratus*, p. 97.
b^{14}. Inner border of hand nearly straight between base of immovable finger and posterior lobe; upper keels of tail smooth or nearly so .... *P. nudus*, p. 96.

70. **Palamnæus swammerdami**, *Simon, Rev. et Mag. Zool.* (2) xxiii, p. 56, f. 3, 1872 (Heterometrus); *Pocock, A. M. N. H.* (6) v, p. 237, 1890; *id. Jour. Bom. N. H. Soc.* vii, p. 304, 1893; *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 42, 1894 (Scorpio); *id. Tierr., Scorp. etc.* p. 112, 1899 (Heterometrus): asper, *Thorell, Atti Soc. It.* xix, p. 199, 1877 (Pandinus): kochii, *Karsch, MT. Münch. ent. Ver.* iii, p. 127, 1879 (Pandinus).

Colour blackish, greenish, or reddish brown; vesicle reddish yellow; hand and legs deep reddish brown; basal segment of mandibles yellowish red. *Carapace* more or less covered with coarse granules; area at the sides of and behind the tubercle on each side swollen and elevated; lateral margins strongly converging in front; in ♀, carapace a little shorter than the 1st and 2nd caudal segments, and about as long as the 5th. *Terga* granular at the sides and posteriorly. *Sterna* smooth and polished; the last scarcely crested. *Tail* long and powerful, about $4\frac{1}{2}$ times as long as the carapace; all the segments coarsely granular above and to a less extent at the sides; segments 1, 2, and generally 3, smooth below, rarely subdenticulate; the rest of the keels denticulate; inferior intercarinal spaces of 4th and 5th segments sparsely granular; *vesicle* large, wider than high, as wide as 5th segment or wider, with 4 rows of granules below, and tolerably thickly granular also at the sides. *Chelæ* with humerus and brachium much shorter than carapace; humerus coarsely granular above and at base below; brachium rugose though scarcely definitely granular behind; hand covered above with large, smooth, oval or circular tubercles, the inner edge sharply tubercular and nearly straight, posterior lobe very long, projecting far back beyond the posterior end of the keel of the underhand; fingers granular beneath, the immovable not crested; movable finger about as long as carapace, a little

exceeding greatest width of hand; underhand about two-thirds the length of the movable finger. *Legs* with granular femora; tarsi armed beneath with 6 posterior and 4 anterior spines, the distal 2 of these situated on the terminal lobes; tips of the lobes furnished with bristles. *Pectinal teeth* 16–20 (♂, ♀).

♂. With larger pectines and a longer tail than in ♀; the tail sometimes nearly five times as long as the carapace, and the latter considerably shorter than the 1st and 2nd segments. Chelæ in ♂ as in ♀.

Measurements in mm. (specimen from Trichinopoly).—♀. Total length 140, carapace 18, tail 78, width of hand 17, underhand 12, movable finger 18.

♂. Total length 138, carapace 17·2, tail 82, width of hand 17, underhand 12·5, movable finger 18·5.

Loc. India and the plains of Ceylon; absent from the Konkan, the Malabar coast, and the hills of Ceylon; Dehra Dún (*Gleadow*); Burdwan and Chota Nagpore (*Dundas Whiffin*) in Bengal; Satna (*Gimlette*) and Raipur (*Martin*) in the Central Provinces; Shahabad (*Bocano*) in the Dekhan; Dowlaishweram on the Godávari (*Wybrow*); Dharwar (*Woodrow*); Madras (*Henderson & Thurston*); Tanjore (*Popert*); Ramnad (*Henderson*, *Fabre*); Trincomali (*Barrett & Bassett-Smith*) and Chilan (*Green*), in Ceylon.

This is the largest Scorpion of India, and, with the exception of its near ally the West-African *Pandinus imperator*, the largest species in the world, sometimes reaching a length of 180 mm. (7 inches).

In addition to the typical form above described, with legs and chelæ a deep brown colour and almost as dark as the upper side of the trunk, the following two subspecies may be recognized:—

Subspecies **lucidipes**, *Simon, Bull. Soc. Zool. Fr.* x, p. 38, 1885 (Scorpio).

Differs from the typical form in having the legs clear yellow.

Loc. Ramnad (*Fabre*); Trichinopoly (*Popert*).

Subspecies **flavimanus**, nov.

Resembles *lucidipes* in having the legs clear yellow, but differs from it and from the typical form in having the hands of the chelæ clear red or yellow, and contrasting strongly with the dark tint of the body.

Loc. Coonoor; Coimbatore (*Brady*, type).

71. **Palamnæus fulvipes**, *C. Koch, Arachn.* iv, p. 45, fig. 278, 1838, (Buthus); *Karsch, Abh. Ver. Bremen*, ix, p. 68, 1887; *Simon. Bull. Soc. Zool. Fr.* x, p. 23, 1885 (Pandinus); *Pocock, Jour. Bom. N. H. Soc.* vii, p. 304, 1893; *Kraep. Jb. Hamb. wiss. Anst.* xi. p. 44, 1894 (Scorpio); *Kraep. Tierr., Scorp. etc.* p. 112, 1899 (Heterometrus).

♀. *Colour* much as in the preceding species; body a deep blackish or reddish brown; hands redder; legs, vesicle, and mandibles clear yellow, or more rarely reddish brown. *Carapace* much flatter than in *P. swammerdami*, not swollen in the middle, its sides less

abruptly converging in front, finely granular at the sides and in front; longer than 1st and 2nd caudal segments, or than 5th. *Tergites* finely granular laterally, smooth in the middle; the last crested as in *P. swammerdami*. *Sterna* smooth as in the latter. *Tail* shorter, about three and a half times as long as the carapace, the upper and lateral surfaces only weakly granular; keels as in *P. swammerdami*, but not so strongly denticulate; vesicle granular as in the last-named. *Chelæ* with humerus not so granular, either above or below, as in *P. swammerdami*, smooth or with a few granules below; *brachium* as in *P. swammerdami*; *hand* granular below and on its inner side as in the latter, but the tubercles of the upper side more crowded and a little smaller; the inner edge of the hand is convex, and the lobe only projects backwards a short distance beyond the posterior end of the keel of the underhand. Moreover the external portion of the upper surface rises vertically from the keel of the underhand and is bordered above by an irregular smooth ridge; immovable finger at most obsoletely crested. *Legs* as in *P. swammerdami*. *Pectinal teeth* rarely as low as 12 in ♀, and as high as 18 in ♂; usually 14–16. Basal angle of pecten about 110°.

♂. Carapace and terga a little more granular tail, a little or considerably longer, and the hand thinner or flatter than in ♀.

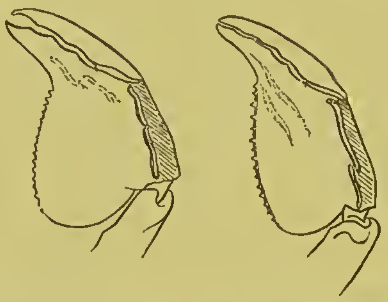
A.  B.

Fig. 25.—A. Hand of *Palamnæus fulvipes*, ♂.
B. Hand of *P. fulvipes*, subsp. *madraspatensis*, ♂.

Measurements in mm. of ♀ (from Násik).—Total length 110, carapace 17, tail 58, brachium 12, underhand 11, movable finger 16, width of hand 15.

Loc. Western and Southern India; absent from the Konkan and Malabar coast and Ceylon. Also recorded from Burma and Java (type), but probably erroneously.

Two well-marked subspecies may be recognized, and diagnosed as follows:—

Subspecies **madraspatensis**, nov.

Chelæ in ♂ long; brachium as long as carapace; hand not so flat, narrower, its width only equal to length of underhand, and less than median length of carapace.

Measurements in mm.—Carapace 15, brachium 15, underhand 12, movable finger 16·5, width of hand 11.

Loc. Madras (*Henderson*); Cuddapah (*Popert*); Secunderabad (*Ricardo*)*.

Subspecies **bombayensis**, nov.

Chelæ in male shorter; brachium much shorter than carapace; hand much flatter above and wider, its width equal to the median length of the carapace and much greater than length of underhand.

Measurements in mm. (of type from Násik).—Length of carapace 16, brachium 14, underhand 10·5, movable finger 15·5, width of hand 14.

Loc. Ajmeer in Rajputana; Pánch Máháls in Guzerat (*Wallinger*); Karaghora in Kattyawar (*Bulkley*); West Khandesh (*Du Boulay*); East Satpura Hills; Talgaon and Chalisgaon in East Khandesh (*Madan*); Niphad, Chandor, Sinnar, Yeola, Malegaon, Nandgaon, and Kalwan in Násik (*Duxbury*).

72. **Palamnæus wroughtoni**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 745, 1899.

♀. *Colour* nearly black, vesicle and mandibles redder; legs very deep olive-brown, with slightly paler extremities. Upper side of body as in *P. fulvipes* but smoother; carapace finely granular at the sides, its median area and frontal lobes quite smooth; terga only very finely and sparsely granular at the sides. *Tail* practically smooth, at most very scantily granular throughout, except the keels, which are armed as in *P. fulvipes*; *vesicle* not granular at the sides. *Chelæ* with humerus and brachium as in *P. fulvipes*; hand with the outer portion of its upper surface vertical and crested as in *P. fulvipes*; the underhand longer and not granular; the whole hand narrower, the inner and outer edges more parallel, the inner edge more convex near the base of the immovable finger and much less convex in its posterior half. *Pectinal teeth* 17.

Fig. 26.—Hand of *Palamnæus wroughtoni*.

Measurements in mm.—Total length 100, carapace 15, tail 51, brachium 12, underhand 11·5, movable finger 14, width of hand 12·5.

Loc. Belgaum (*Talbot*), and Gadingal in the Kolhápur State (*Wray*).

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* Young specimens from Dharwar (*Woodrow*), and Ráybág and Kalkal in the Kolhápur State (*Wray*), are doubtfully referred to this subspecies.

73. **Palamnæus latimanus**, *Pocock, A. M. N. H.* (6) xiii, p. 74, 1894 (Scorpio); *Kraep. Tierr., Scorp. etc.* p. 113, 1899 (Heterometrus).

Colour (dry specimen) castaneous, with yellow legs; chelæ darker. *Carapace* finely granular at the sides, on the frontal lobes, and in the median anteocular groove; longer than the 1st and 2nd and half the 3rd caudal segments or than segments 3 and 4, and as long as the 5th and ⅔ of the 4th. *Tergites* only weakly granular at the sides. *Sterna* smooth, the last with four strong crests. *Tail* short, not more than three times as long as the carapace, almost entirely smooth, lateral surface rugose, superior and supero-lateral crests on segments 1–3 practically smooth; keels of 4th weakly denticulate, of 5th normally denticulate; vesicle granular

A. B.

Fig. 27.—A, Hand, and B, tarsus of 4th leg of *Palamnæus latimanus*.

below. *Chelæ* with humerus very weakly granular above, strongly granular in front; brachium practically smooth throughout; hand very wide, its inner border strongly convex and rising at right angles to the base of the immovable finger, its inner edge denticulate, covered above with a reticulation of smooth ridges, which become more tubercular towards the base of the fingers and externally, and entirely disappear posteriorly; lower surface with a few granules; width of hand almost equal to length of carapace and to movable digit; immovable finger with a strong crest. *Legs* with posterior femora very weakly granular; spine-armature of tarsi, 6 behind, 5 in front, but differing from all the other species in having a strong spine, not bristles, upon the upper angle of the tarsal lobe. *Pectinal teeth* 15.

Measurements in mm.—Total length 75 (about), carapace 12·8, tail (segments 1–5) 30·5, brachium 9, underhand 7·8, movable finger 12, width of hand 11·5.

Loc. ? India.

74. **Palamnæus gravimanus**, *Pocock, A. M. N. H.* (6) xiii, p. 75, 1894 (Scorpio).

♂. *Colour:* body reddish black, legs dark reddish brown. *Carapace* smooth above, weakly granular at the sides, frontal lobes

obsoletely rugose; about as long as the 3rd and 4th caudal segments. *Terga* granular laterally and posteriorly, smooth in the middle, the last very sparsely granular in the middle. *Sterna* smooth, the last with four weak crests. *Tail* about $3\frac{1}{2}$ times as long as carapace, upper and lateral surface of segments sparsely granular; superior and inferior lateral crests of segments 1–3 weakly denticulate, inferior crests of 4th weakly subdenticulate posteriorly, upper surface of 5th somewhat coarsely granular at the sides; *vesicle* granular at the sides as well as below. *Chelæ* with humerus coarsely but not closely granular above; brachium almost entirely smooth, with only a few granules in front; hand covered above with low round or elongate, often anastomosing tubercles, and furnished with four smooth longitudinal ridges; external portion of upper surface not vertical, cutting the underhand at an acute angle; the inner edge studded with small tubercles, smooth, compressed, and upturned at base of immovable finger, the edge of which in its posterior half is similarly compressed; lower surface very weakly granular; immovable finger with a low crest; width of hand about equal to movable finger and a little less than length of carapace. Tarsal spines 4–5. *Pectinal teeth* 12–14 (♀, ♂).

Fig. 28.—Hand of *Palamnæus gravimanus*. ♂.

Measurements in mm.—Total length 100, carapace 16, tail 53·5, brachium 14·5, underhand 12·5, movable finger 15·5, width of hand 14·5.

Distribution. S. India, Tanjore (*Popert*); Ceylon (*Templeton*).

75. **Palamnæus liurus,** *Pocock, Jour. Bom. N. H. Soc.* xi, p. 114, 1897; *Kraep. Tierr., Scorp. etc.* p. 115, 1899 (Heterometrus).

♀. *Colour* of upper side and of tail a deep reddish brown, darker on the abdomen beneath; legs and vesicle yellow; chelæ reddish brown. *Carapace* very finely granular at the sides, smooth above, with frontal lobes slightly rugulose; almost as long as the first three caudal segments or as the 4th and 5th, considerably longer than 3rd and 4th. *Terga* smooth and polished, the last subrugose at the sides, with a pair of piliferous tubercles on each side. *Sterna* smooth and polished, the last with four smooth crests. *Tail* short, scarcely three times as long as the carapace; smooth, the keels at most roughened with punctures, and inferior keels of 5th denticulate; *vesicle* small, smooth, merely punctured. *Chelæ* with humerus coarsely granular in front, sparsely above; brachium quite smooth, except for some coarse granules on the front below; hand covered above with a network of smooth ridges, which pass into tubercles towards the inner edge and externally, inner edge denticulate, lightly convex; immovable finger with

complete smooth keel; underhand equal to width of hand, and about four-fifths the length of the immovable finger, which is almost as long as carapace. Spine-armature of tarsi 4–5. *Pectinal teeth* 10–13.

♂. *Terga* finely and closely granular laterally and posteriorly. *Tail* longer than in female, more than three times as long as carapace, which is considerably shorter than its 4th and 5th segments; vesicle inflated, as wide as 3rd segment. *Chelæ* longer than in female; brachium a little longer than carapace; underhand a little shorter, but much exceeding width of hand. *Genital operculum* not narrowed posteriorly. Pectinal teeth 14–16; basal angle of pecten about 90°.

Measurements in mm.—♀. Total length 76, carapace 12, tail 35, brachium 10, underhand 9, movable finger 11·5, width of hand 9·2.

♂. Total length 80, carapace 12, tail 39, brachium 12·2, underhand 11, movable finger 13, width of hand 8.

Loc. Central India: Gwalior and Bhopal (*Dane*).

76. **Palamnæus xanthopus,** *Pocock, Jour. Bom. N. H. Soc.* xi, p. 116, 1897; *Kraep. Tierr., Scorp. etc.* p. 115, 1899 (Heterometrus).

♀. In size, colour, &c. resembling small specimens of *P. fulvipes*. *Carapace* weakly granular laterally and on the frontal lobes, longer than 3rd and 4th caudal segments, and nearly as long as 4th and 5th. *Terga* smooth, the last weakly granular at the sides. *Sterna* smooth, the last with four crests. *Tail* about three times the length of the carapace, smooth above, scarcely granular laterally, superior and supero-lateral keels weakly denticulate: inferior keels of 3rd weakly denticulate; 5th segment carinate as in *P. fulvipes*, with no denticulate supero-lateral crests; *vesicle* granular at the sides and below. *Chelæ*: brachium with superior crest granular, posterior surface only lightly rugose: hand not crested above as in *P. fulvipes*; upper side strongly convex, ornamented with a reticulation of ridges, inner edge subdenticulate, strongly rounded; lower side nearly smooth; width equal to length of movable finger, much greater than length of underhand. Spine-armature of tarsi 5–6. *Pectinal teeth* 13–15 (♂, ♀).

♂. Carapace almost covered with granules. Terga finely and closely granular in the posterior half. Chelæ longer, brachium almost as long as carapace; width of hand a little exceeding underhand and less than movable finger.

Measurements in mm.—♀. Total length 74, carapace 11, tail 34, brachium 7, underhand 6·5, movable finger 9, width of hand 9.

♂. Total length ?, carapace 11, tail ?, brachium 9·5, underhand 8, movable finger 10·3, width of hand 8·7.

Loc. Western India: Kadao Tal in the Satara District (*Wilkins*).

77. **Palamnæus scaber**, *Thorell, Atti Soc. It.* xix, p. 202, 1877 (Pandinus), *for* Heterometrus afer, *Sim.* (nec *Linn.*) *Rev. Mag. Zool.* (2) xxiii, p. 51, 1872; *Pocock, Jour. Bom. N. H. Soc.* vii, pp. 310–311, 1893; *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 58, 1894 (Scorpio); *Kraep. Tierr., Scorp. etc.* p. 116, 1899 (Heterometrus).

♀. *Colour* uniformly black or blackish green, with hands and vesicle tinged with red. *Carapace* covered with coarse granules or tubercles, smoother above as a rule; a little longer than 1st and 2nd caudal segments, shorter than 3rd and 4th. *Terga* also coarsely granular or tubercular, with a larger central tubercle. *Sterna* smooth, the last obsoletely crested. *Tail* more than three and a half times as long as carapace, superior and lateral intercarinal spaces coarsely granular, superior and in a less degree supero-lateral keels denticulate; inferior keels of 3rd segment scarcely denticulate; keels of 5th strongly dentate; *vesicle* coarsely granular at the sides as well as below. *Chelæ* with humerus dentate above and in front; brachium almost smooth, a few granules in front; upper surface of hand very smooth, finely reticulated, punctured, its inner edge denticulate, nearly straight; immovable finger scarcely keeled; width of hand exceeding length of underhand. Tarsal spines 4–5. *Pectines* small, teeth 10–12.

♂ like female, but more closely granular and with chelæ longer (*see* measurements). Pectines quite small, not larger, and with teeth not more numerous than in female.

Measurements in mm.—♀. Total length 130, carapace 19, tail 70, brachium 15, underhand 13, movable finger 20·5, width of hand 16.

♂. Total length 113, carapace 17, tail 63, brachium 15, underhand 12·5, movable finger 18, width of hand 13.

Loc. S.W. India: the Malabar coast from Trevandrum (*Ferguson*) northwards to Yelgit and Jedkal in Mangalore and the Mangalore Gháts (*Battie*); also Dharwar (*Woodrow*), and Coorg above the Gháts.*

Subspecies **kanarensis**, nov.

Of the same size, colour, and sculpturing of hand as the typical form, but much smoother: the median area of the carapace smooth or weakly granular; terga also furnished in the middle with only a few granules or almost smooth, sometimes only the three transversely set tubercles present; intercarinal spaces of tail also more sparsely granular and the keel less strongly denticulate.

Loc. Kanara (*Bell*).

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* In his original description of this species, which he erroneously identified with the *Scorpio afer* of Linn., Simon says "appears to be common in Bengal." This, however, is almost certainly an error, since the only species of the genus *Palamnæus* known to occur in Bengal are *swammerdami* and *bengalensis*, and possibly the Burmese form *oatesii*.

78. **Palamnæus bengalensis**, *C. Koch, Arachn.* ix, p. 3, fig. 696, 1842 (Buthus); *Pocock, Jour. Bom. N. H. Soc.* vii, pp. 310 & 312, 1893; *id. A. M. N. H.* (6) xiii, p. 72, 1894; *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 51, 1894 (Scorpio); *Kraep. Tierr., Scorp. etc.* p. 114, 1899 (Heterometrus).

♀. *Colour* generally dark reddish brown, more rarely deep blackish green; legs the same colour as the dorsal surface of the body; vesicle yellowish red. *Carapace* granular laterally, mostly smooth above, scarcely so long as the 3rd and 4th caudal segments. *Terga* granular laterally. *Sterna* smooth, the last only obsoletely crested. *Tail* about three and a half times as long as carapace, its dorsal surface nearly smooth, lateral surface finely granular; superior and inferior lateral keels denticulate, inferior keels of 4th denticulate, of 3rd very weakly so; *vesicle* granular below and at the sides. *Chelæ*: brachium with upper crest rugose; posterior surface not crested above, rugose; hand narrow, its width not much exceeding underhand, inner edge denticulate, lightly convex, upper surface covered with a reticulation of ridges and low tubercles, the tubercles more distinct externally and internally; outer portion of upper surface vertical, strongly convex; immovable finger weakly crested; movable finger about as long as carapace. Tarsal spine-armature 6–4. *Pectinal teeth* up to 16 in ♂, as low as 12 in ♀.

♂. With longer and more powerful tail and longer chelæ than ♀. *Tail* nearly four times the length of the carapace. *Brachium* as long as carapace; underhand much longer than width of hand; movable finger as long as carapace or longer.

Measurements in mm. (specimen from Satna).— ♀. Total length 103, carapace 14, tail 49, brachium 11, underhand 10, movable finger 14, width of hand 10.

♂. Total length 103, carapace 15, tail 57, brachium 15, underhand 12·2, movable finger 16, width of hand 9.

Loc. North India: Dehra Dún (*Gamble, Smythies, Gleadow*); Gwalior and Allahabad; Satna in the Central Provinces (*Gimlette*): Bengal, Chota Nagpore (*Dundas-Whiffin*); Sibsagar in Assam (*Cambridge*).

79. **Palamnæus phipsoni**, *Pocock, Jour. Bom. N. H. Soc.* vii, p. 370, 1893; *A. M. N. H.* (6) xiii, p. 73, 1894 (Scorpio); *Kraep. Tierr., Scorp. etc.* p. 114, 1899 (Heterometrus).

♀. *Colour* a uniform blackish green or brown; vesicle ferruginous. Upper side of body rather smoother than in *P. bengalensis*; sides and upper surface of tail also smoother. *Carapace* as long as 3rd and 4th segments; vesicle smooth at the sides; inferior keels of 4th nearly smooth, not so distinctly denticulate as in *P. bengalensis*. Integument finely punctulate under the lens; the punctulation especially distinct upon the last sternum of the abdomen, which has no trace of crests. *Chelæ* with hand much broader than in *P. bengalensis*, the width exceeding the underhand, the inner border more strongly convex and more coarsely denticulate; the sculpturing of the upper surface consisting of distinct rounded, oval or

irregularly shaped tubercles; immovable finger with distinct keel. Tarsal spine-armature 6–5. *Pectinal teeth* up to 16 in ♂, as low as 10 in ♀.

♂. Differing from ♀ in the same characters as *P. bengalensis* (*see* measurements).

Measurements in mm.—♀. Total length 113, carapace 16, tail 55, brachium 14, underhand 12·2, movable finger 16, width of hand 14·5.

♂. Total length 110, carapace 16·5, tail 60, brachium 18, underhand 15, movable finger 17, width of hand 12.

Loc. Bombay and Matheran (*Phipson*); Kolata (*Green*), Tanna in the North Konkan (*Wroughton*), Ratnagiri in the South Konkan (*Drew*); north, central, and south Peint, Násik Ghats, Dindori and Lena in Násik (*Duxbury*); Bhudhargarh and Panhála in the Kolhápur State (*Wray*).

Subspecies **collinus**, nov.

Closely resembling the typical form in size, colouring, and other characters, but with the tail distinctly shorter in both male and female. In the female it is less than three times as long as the carapace, and the latter is longer than the 1st, 2nd, and half the 3rd, and as long or almost as long as the 3rd and 4th caudal segments. (In the typical form the tail is about three and a half times as long as the carapace, and the latter is shorter than the 1st, 2nd, and half the 3rd, and only as long as the 4th and $\frac{2}{3}$ of the 5th caudal segments.) Moreover, the hand in *carnaticus* is lower and not so strongly convex above the keel of the underhand.

Measurements in mm. (type from Nilgiri Hills).—Total length 95, carapace 16, tail 42·5.

Loc. Nilgiri Hills (*Daly*); Yercaud in the Shevaroy Hills (*Henderson*).

80. **Palamnæus barberi**, sp. n.

Colour a deep blackish green all over except the hands, which are orange-yellow, darker externally and blackish towards the base of the fingers. *Carapace* weakly granular laterally and on the frontal lobes; longer than 3rd and 4th caudal segments. *Terga* scarcely granular laterally, except the last, which has some coarse granules. *Sterna* smooth, the last not crested. *Tail* short, about three times as long as the carapace; segments smooth between the keels or nearly so; superior keels normally but not strongly denticulate, inferior keels of 3rd smooth, of 4th denticulate posteriorly; *vesicle* smooth at the sides. *Chelæ* with humerus and brachium as in *P. phipsoni*, but upper crest of brachium not so pronounced; hand ornamented with a reticulation of ridges much as in *P. bengalensis*, not so smooth as in *P. scaber* but very nearly resembling that of the latter in shape; coarsely granular on its inner side and having a pair of granular crests; immovable finger with complete crest. Tarsal spine-armature 6–4. *Pectinal teeth* 11–12; basal angle of pecten about the same as in *P. phipsoni*.

Measurements in mm.— ♀. Total length 124, carapace 19, tail 58, brachium 16, underhand 13, movable finger 18, width of hand 15.

Loc. Tinnevelly in S. India (*Barber*).

81. **Palamnæus indus**, *De Geer. Mém. Hist. Ins.* vii, p. 341, 1778 (Scorpio); *Thorell, Atti Soc. It.* xix, p. 164, 1877 (Scorpio); *Kraep. Tierr., Scorp. etc.* p. 113, 1899 (Heterometrus): ceylonicus, *Herbst, Nat. ungefl. Ins.* iv, p. 38, pl. i, fig. 1, 1800; *Kraep. Jb. Hamb. Wiss. Anst.* xi, p. 46, 1894 (Scorpio): megacephalus, *C. Koch, Arachn.* iii, p. 73, fig. 224, 1837 (Buthus); *Thorell, Atti Soc. It.* xix, p. 203, 1877 (Pandinus); *Pocock, Jour. Bom. N. H. Soc.* vii, p. 311, 1893 (Scorpio).

Related to *P. phipsoni* and *flavimanus*.

♀. Colour a uniform deep blackish green. *Carapace* smooth above and on the frontal lobes, granular at the sides, a little longer than 3rd and 4th caudal segments. *Terga* almost entirely smooth, the last with a few granules at the sides. *Sterna* smooth, the last with four low crests. *Tail* short, about three times as long as the carapace; almost entirely smooth; the superior and supero-lateral keels at most weakly denticulate, sometimes quite smooth; inferior crests of 4th denticulate posteriorly; upper side of 5th not granular except along the lateral keel; *vesicle* scantily granular laterally or smooth. *Chelæ* with hand very large, its inner edge shaped much as in *P. flavimanus* and *scaber*, not so convex as in *P. phipsoni*; the dorsal surface flatter than in these species, the external portion of the upper surface not so vertical; keel of underhand very strong, stronger than in the species just mentioned and more convex; upper side studded with rounded, oval, or irregularly-shaped tubercles, much like those of *P. phipsoni*; lobe of hand large; width of hand almost as great as length of movable digit or of carapace; immovable finger with smooth crest. Tarsal armature mostly 5–4. *Pectinal teeth* 11–12; base of pecten very narrow, the teeth starting some distance from its point of attachment.

♂. Scarcely differing from ♀ in form of chelæ and length of tail, and thus easily recognizable from the male of *P. phipsoni* or *bengalensis*. Pectines larger than in ♀

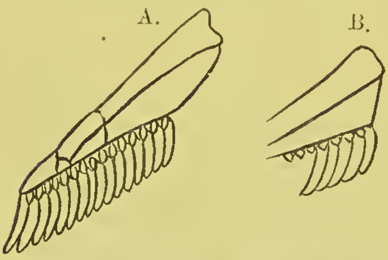

Fig. 29.—A. Pecten of *Palamnæus indus*. B. Base of pecten of *P. fulvipes*.

Measurements in mm.— ♀. Total length 117, carapace 20, tail 62, brachium 16, underhand 15, movable finger 21, width of hand 18·5.

♂. Total length 101, carapace 17, tail 55, brachium 14, underhand 11, movable finger 17·5, width of hand 14.

Loc. Ceylon (*Templeton, Barnes,* etc.), Peradeniya (*Freeman*).

82. **Palamnæus serratus**, sp. n.: Scorpio cæsar, *Pocock, A. M. N. H.* (6) xiii, p. 73, 1894 (*nec* Buthus cæsar, *C. Koch, Kraepelin*).

♂. *Colour* as in the preceding, to which it is nearly allied. *Carapace* and *terga* more coarsely granular laterally. Superior and supero-lateral crests of *tail* strongly denticulate; lateral surface of segments sparsely granular, upper side of 4th segment with some coarse granules, of 5th with many large granules on the anterior half on each side of the median sulcus. *Chelæ* with hand ornamented above as in *P. indus*, the inner border more strongly convex, forming anteriorly with the base of the immovable finger an angle much less obtuse than in that species, the denticles of the inner border running right up to the base of the immovable finger, the edge of which is at least as thick as in *P. indus*; the underhand reticulated and furnished with a few large granules; keel on immovable finger complete as in *P. indus*. *Pectines* practically as in *P. indus*. Tarsal spine-armature 6 or 5 behind, 4 in front.

Measurements in mm.—♂. Total length 125, carapace 18, tail 64, brachium 15, underhand 12·5, movable finger 19, width of hand 17.

Loc. Ceylon.

83. **Palamnæus cæsar**, *C. Koch, Arachn.* ix. p. 6, fig. 697, 1842 (Buthus); *Kraep. Tierr., Scorp. etc.* p. 114, 1899 (Heterometrus).

According to Kraepelin's description this species differs from *P. serratus* in having the frontal lobes of the carapace thickly granular or tubercular; the inner edge of the hand forms a well rounded arch where it passes into the immovable finger, which is very flat, wide, and has a sharp, smooth, not swollen border; the keel on its upper side is weak and becomes obsolete in the middle; the underhand is beset with conspicuous isolated tubercles; the tarsi are armed beneath with 5 or 6 spines behind, 3 in front. Pectinal teeth 12–16.

Loc. Ceylon.

84. **Palamnæus longimanus**, *Herbst, Nat. ungefl. Ins.* iv, p. 42, pl. ii, fig. 1, 1800 (Scorpio); *Kraep. Tierr., Scorp. etc.* p. 111, 1899, in part (Heterometrus): bengalensis, *Simon, Ann. Mus. Genov.* xx, p. 360, 1884 (*nec* Buthus bengalensis, *C. Koch*, 1842): petersii, *Thorell, Ann. Mus. Genova*, (2) vii, p. 588, 1889 (*nec* petersii, *Thor.* 1876 & 1877): thorelli, *Pocock, A. M. N. H.* (6) ix, p. 40, 1892 (Palamnæus).

♀. *Colour* a uniform black or deep blackish brown, reddish brown below and on the hands and vesicle. *Carapace* granular at the sides and on the frontal lobes, smooth or obsoletely granular above, differing from all the foregoing species in having the depression on each side of the median ocular tubercle continuous posteriorly with the postero-lateral sulcus of the carapace; a little longer than the 3rd and 4th caudal segments. *Terga* weakly granular at the sides;

the last subgranular in the middle, more coarsely granular at the sides and furnished with a pair of short granular crests. *Sterna* smooth and polished; the last not crested. *Tail* less than three and a half times as long as carapace, upper surface smooth, lateral surface only weakly granular; superior and inferior lateral crests denticulate, inferior keels of 4th weakly denticulate, superior lateral crest of 5th rectangular but only subdenticulate; *vesicle* smooth or almost smooth at the sides. *Chelæ* with humerus weakly granular in its basal half above; the upper and anterior surface bounded by strongly denticulate crests, the anterior surface with a few large tubercles; lower surface lightly reticulated mesially, with long finely granular posterior crest; brachium shorter than carapace, armed in front at base with single long spine, posterior surface smooth; *hand* thick, strongly convex above, its inner edge not so compressed as in the Indian species, the width less than length of underhand, which is about three-fourths the length of the movable finger; dorsal surface of hand smooth, punctured and obsoletely reticulated, weakly carinate, the reticulation becoming coarser toward the inner edge, which is itself somewhat thickly and coarsely granular; immovable finger with smooth keel. Penultimate fang of the movable finger of the *mandibles* longer than in the foregoing species. Tarsal spine-armature 7 or 6 behind, 4 in front. *Pectinal teeth* about 14–16 (♂, ♀).

♂. *Tail* a little and *chelæ* very much longer than in the female; tail not quite four times as long as carapace, which is shorter than the 3rd and 4th caudal segments; both humerus and brachium much longer than carapace; hand very long and slender, nearly parallel-sided, the width half the length of the underhand, which is longer than carapace and almost as long as the movable finger.

Measurements in mm.—♀. Total length 117, carapace 17, tail 56, humerus 13, brachium 14, underhand 13, movable finger 17, width of hand 11·5.

♂. Total length 103, carapace 16, tail 60, humerus 19, brachium 19, underhand 17, movable finger 19, width of hand 9.

Loc. Occurring in abundance throughout Burma (*Comotto, Oates, Fea*); Andaman Islands, Port Blair (*Pratt*). Borneo.

85. **Palamnæus oatesii**, nom. nov.: Palamnæus spinifer, *Pocock, A. M. N. H.* (6) ix, p. 40, 1892: [? spinifer, *Hempr. & Ehrenb. Symb. Phys., Scorp.* p. 3, t. i, fig. 2, 1829 (Heterometrus)]: P. petersii, *Thorell, Atti Soc. It.* xix, p. 214, 1877 (nec petersii, *Thorell, A. M. N. H.* (4) xvii, p. 13, 1876) *.

♀. Resembling the preceding in colour but more polished, and with the vesicle generally reddish yellow and much paler as a

* The name *petersii* was originally applied by Thorell in 1876 to the Cochin China form which Simon in 1872 had erroneously described and figured as *megacephalus*, C. Koch, and which he subsequently in 1882 renamed *silenus*.

rule than the segments of the tail. The upper elevated portion of the *carapace* quite smooth and polished, without a trace of granules; the margins of the frontal lobes distinctly denticulated. *Tail* not granular, keels more strongly denticulated. *Hand* with upper surface smoother, more polished, less strongly crested; its inner edge studded with much larger denticles. *Pectinal teeth* 14–18 (♂, ♀).

♂. Strikingly different from the male of *P. longimanus*, with secondary sexual characters poorly developed; brachium a little longer than humerus, but not or scarcely longer than carapace; hand not narrowed, its width equal or nearly equal to underhand and considerably less than movable finger; inner edge of hand shaped as in female, lightly convex, with large rounded lobe, not straight and parallel to the outer surface as in *P. longimanus*.

Measurements in mm. (specimens from Rangoon).—♀. Total length 128, carapace 18, tail 67, humerus 14, brachium 16, underhand 15, movable finger 20, width of hand 14.

♂. Total length 114, carapace 16·5, tail 62, humerus 14, brachium 15, underhand 14, movable finger 18, width of hand 12·5.

Large specimens of this species reach a length of 180 mm.

Loc. * Burma: Rangoon (*Oates*) and Mergui (*Anderson*). Siam; Singapore.

The following species no doubt belongs to this genus; but is not recognizable:—

Scorpio leioderma, *Dufour, Mém. prés. Ac. Sci. Paris,* xiv, p. 571, 1856.

Colour subfuscous, with paler legs. Very smooth; carapace with eight eyes, emarginate and bilobed; hands very wide, rough; caudal segments granular. Pectinal teeth 13. Length 4 inches (french)=108 millim.

Loc. Malabar.

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* There are a couple of specimens in the British Museum labelled "Bengal." This locality, however, requires verification,

Order UROPYGI.

At once recognizable from the Scorpions, to which the larger species present considerable superficial resemblance, by the presence of a deep constriction between the cephalothorax and abdomen, by the absence of pectines or combs on the sternal area and of poison-glands in the postanal skeletal piece.

Cephalothorax longer than wide, the carapace sometimes segmented posteriorly: the ventral surface narrow and furnished with two or three sternal plates (fig. 31, p. 103)—an anterior or *prosternum*, broad in front and narrowed behind, lying behind the coxæ of the chelæ and separating the bases of the anterior legs; a posterior or *metasternum* which lies between the coxæ of the 4th pair of legs; and sometimes a minute *mesosternum* between the coxæ of the 3rd legs. *Mandibles* chelate, consisting of two segments. *Chelæ* large and prehensile; the segments named as follows from base to tip: *coxa*, *trochanter*, *femur*, *tibia*, *hand*, *finger*; the coxæ united in the middle line and furnished in front with a pointed *maxillary process*. *Legs* of 1st pair long, slender, and antenniform, consisting of six segments: *coxa*, *trochanter*, *femur*, *patella*, *tibia*, and *tarsus*; the tarsus subdivided into 8 or 9 segments, the basal of which is very short. The rest of the legs ambulatory in function, and consisting of 7 segments named as above with the addition of a *protarsus* which precedes the three-jointed tarsus; the tarsus bearing three claws; coxæ of 2nd and 3rd legs not widely separated in the middle line of the sternal area. *Abdomen* consisting of 12 somites, represented by tergal and sternal plates, but the sternum of the 1st wholly or partially obliterated, at most forming a strengthening skeletal piece on the underside of the waist, and in systematic descriptions not taken into account, the sternum of the 2nd somite being termed the 1st abdominal sternum. *Generative organs* opening in the middle line behind the sternum of the 2nd somite, which is often much modified. Last three somites annuliform or cylindrical, forming a movable stalk for the postanal skeletal piece, which consists of a single segment or has the form of a many-jointed caudal flagellum or filament. The unmodified terga and sterna impressed with a pair of muscular scars or *sigilla*.

The two suborders into which the genera of this Order are classified may be briefly diagnosed as follows:—

a. Carapace unsegmented; last segment of abdomen bearing a long jointed flagellum . . . . UROTRICHA.

b. Carapace segmented: last segment of abdomen bearing a short unjointed skeletal piece . . . . TARTARIDES.

Suborder *UROTRICHA*.*

Carapace unsegmented, furnished at its fore extremity with a pair of median eyes set close together and with a cluster of 3 lateral eyes on each side, some distance behind the medians. *Chelæ* folding in a horizontal plane; the coxa short, the tibia armed with a long inwardly directed spine or *apophysis*, against which the hand closes; hand with a corresponding apophysis, the *immovable*

Fig. 30.—*Thelyphonus indicus*, ♂.

c, carapace; *o*, first tergum of abdomen; *m*, ommatoid or last segment of abdomen; *n*, caudal flagellum; *z*, trochanter; *x*, femur; *a*, tibial apophysis; *d*, hand; *c*, movable finger of chela; *b*, tarsal segments of 1st leg; *f*, coxa; *g*, trochanter; *h*, femur; *i*, patella; *j*, tibia; *k*, protarsus; *l*, tarsus of 4th leg.

finger, which forms with the movable finger a complete pincer; claw fused with extremity of movable finger. 1st *leg* with tarsus consisting of 9 segments; 2nd leg with coxa unarmed; 2nd, 3rd, and 4th legs with tibia long and protarsus very short, the extremity of the tibia often armed on the underside with a slender spine, the *tibial spine*. Postanal skeletal piece consisting

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* I here restore for this group the very appropiate name which was given to it by C. Koch. Thorell applied to it the term *Oxopoei*, or "acid-makers," in allusion to the defensive pungent secretion the animals emit when handled. In ordinary phraseology these animals are known as "Whip-Scorpions."

of a long, hairy, many-jointed feeler or *flagellum*. Last abdominal segment in all the Indian species bearing at the base of the flagellum a pair of yellow spots, the *ommatoids*. *Respiratory organs* in the form of two pairs of pulmonary sacs, the first pair opening behind the 1st abdominal sternum in a line with the generative orifice, the second pair behind the 2nd sternum.

Sexual characters.—Adult males differ from the females and young males in having the chelæ longer and thicker, or otherwise modified, and the 1st abdominal sternum considerably inflated.

Habits. Whip-Scorpions are found in damp places beneath stones or pieces of wood, in the crannies of rocks or of termites' nests, or other crevices where shelter from light and protection from the rays of the sun are obtainable. Some of the species excavate burrows for the protection of themselves and their young. The young are hatched from eggs, which the female previously carries about enswathed in a glutinous membrane and attached to the lower side of the abdomen.

Distribution. Oriental Region from India and Ceylon to the Fiji Islands and New Hebrides, and extending northwards into China and Southern Japan ; Neotropical Region from Brazil northwards into the Southern States of North America. Absent from Africa, Madagascar, Australia, and New Zealand.

In the following descriptions the chelæ are regarded as extending forwards in a direction parallel to the long axis of the body. The total measurement is taken from the front end of the head to the base of the caudal filament.

Family THELYPHONIDÆ.

Characters of the suborder.

Synopsis of Indian Genera.

a. Carapace with a sharp keel running forwards on each side of the head in front of the lateral eyes ; ocular tubercle high.
- a^1. Maxillary process of coxa of chela armed on its inner edge with a strong sharp spiniform tooth .... UROPROCTUS, p. 106.
- b^1. Maxillary process of coxa of chela not armed with a tooth on the inner side .. THELYPHONUS, p. 103.

b. Carapace without a keel running forward from the lateral eye on each side of the head ; ocular tubercle low.
- a^2. Maxillary process of coxa of chela with a strong sharp tooth on its inner margin. LABOCHIRUS, p. 107.
- b^2. Maxillary process of coxa of chela unarmed internally .... HYPOCTONUS, p. 111.

Genus THELYPHONUS, Latr.

Thelyphonus, *Latreille, Hist. Nat. Crust. Ins.* iii, p. 47, 1802, in part; also of *Lucas, Koch, Butler, Stoliczka, etc.* (in part).
Thelyphonus (emend.), *Pocock, A. M. N. H.* (6) xiv, p. 121, 1894; *Kraepelin, Abh. Ver. Hamb.* xv, p. 19, 1897; *id. Tierr., Scorp. etc.* p. 212, 1899.

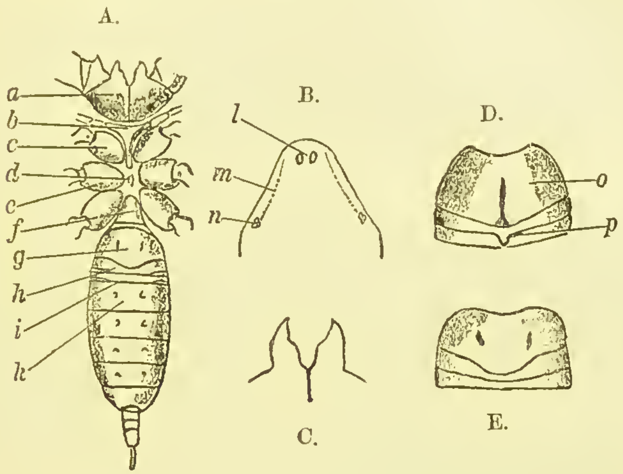


Fig. 31.—*Thelyphonus indicus.*

A. Lower side of cephalothorax and abdomen, ♀. *a*, coxa of chela; *b*, prosternal plate; *c*, coxa of 2nd leg; *d*, mesosternal plate; *e*, coxa of 3rd leg; *f*, metasternal plate; *g*, first sternum, *h*, second sternum, *i*, third sternum, *k*, fourth sternum, showing muscular sigilla, of abdomen.
B. Anterior extremity of carapace: *l*, median, *n*, lateral eyes; *m*, crest.
C. Maxillary processes of chelæ.
D. Lower side of anterior end of abdomen of ♂: *o*, first sternum; *p*, tooth on second sternum.
E. Lower side of anterior end of abdomen of ♀.

Carapace with granular crest, running forwards from the lateral eyes on each side; median eyes situated one on each side of a high distinct ocular tubercle; maxillary process of chelæ not toothed internally. *Chelæ* in ♂ thicker but not much longer than in ♀; the tibial apophysis of the same form in both sexes, with toothed edges and terminating in a sharp point. First abdominal sternal plate in ♂ with deep median groove; 2nd with median tooth-like spine.

Type, *T. caudatus* (Linn.). Java.

Distribution. Ceylon and S. India; Burma, thence eastwards to the Philippine Islands, and over the whole of the Indo- and Austro-Malayan area as far as the Solomon Islands.

Synopsis of Indian Species and Subspecies.

Females.

a. First abdominal sternum with posterior border truncate; maxillary process of chela not shouldered .... *T. schnehagenii*, [p. 105.

b. First abdominal sternum with posterior border mesially produced and convexly rounded; maxillary process shouldered.

a^1. Abdominal sterna with distinct raised median line .... *T. cristatus*, p. 105.

b^1. Abdominal sterna without raised median line.

a^2. Legs dark, as dark as body, pale reddish only at extremities .... *T. sepiaris*, typical [form, p. 104.

b^2. Legs uniformly red, much paler than body. Subspecies *indicus* [& *muricola*, p. 105.

Males.

a. Abdominal sterna smooth and polished, only minutely punctulate and obsoletely striate .... *sepiaris*, subspecies [*muricola*, p. 105.

b. Abdominal sterna (except the anterior) coarsely rugose and subgranular throughout.

a^1. Legs dark brown, pale at the extremities.... *sepiaris*, typical [form, p. 104.

b^1. Legs uniformly red .... *sepiaris*, subspecies [*indicus*, p. 105.

86. **Thelyphonus sepiaris**, *Butler, Cist. Ent.* i, p. 131, ♂ (May 1, 1873); *Pocock, A. M. N. H.* (6) xiv, p. 122, 1894; *Kraep. Abh. Ver. Hamb.* xv, p. 35, 1897; *id. Tierr., Scorp. etc.* p. 223, 1899: nigrescens, *Butler, Cist. Ent.* i, p. 131, 1873 (♀).

Colour black or blackish brown above and on chelæ, reddish brown below; legs black, with the tibiæ and tarsi deep red-brown. *Carapace* and *terga* coarsely rugose, with close-set punctures and granules, a smooth paler median line present on 2nd and 3rd and just traceable on posterior terga. First *sternum* shining, sparsely punctured and striate, granular marginally; the rest coarsely rugose, without traceable median line. *Chelæ*; maxillary process of *coxa* internally shouldered; femur and tibia granular below, polished and punctured above; trochanter granular above, armed below with 2 teeth (rarely 1), and with 5–6 above; femur with 1–2 small tubercles above and 1 below; tibial apophysis armed in front with 6 or more teeth and behind with about 3; hand thicker than tibia, its inner edge denticulate, granular internally; movable finger with anguliform subapical tooth. *Legs* of 2nd, 3rd, and 4th pairs with tibial spine. *Caudal flagellum* hairy.

♀. Differing from ♂ in having the *sterna* smooth, punctured, and scratched with transverse lines. Teeth on trochanter and femur of *chela* larger; hand narrower than tibia; movable finger without subapical tooth. Tarsal segments of 1st *leg* unmodified. First abdominal *sternum* with its posterior border strongly and convexly produced.

Length of body up to about 40 mm.

Loc. S. India: Madras (*Sale*, *Jerdon*, *Boileau*); Ceylon (*Holdsworth*), Jaffna (*Sarasin*); Trincomali (*Yerbury*, *Green*, *Barrett*, *Basset-Smith*); Tenasserim (*Packman*)*.

Subspecies **indicus**, *Stoliczka*, *J. A. S. B.* xlii, p. 138, t. 12, fig. 5, May 28, 1873 (♂); *Oates*, *J. A. S. B.* lviii, pt. 2, p. 9, t. ii, figs. 1–6, 1889: beddomei, *Stoliczka*, *J. A. S. B.* xlii, p. 142, t. 12, fig. 6, 1873 (♀).

Both sexes distinguished from the typical form by having the legs entirely red, and contrasting strongly with the black colour of the upper side of the trunk †.

Loc. Southern India: Anaimalai Hills (*Beddome*); Nilgiri Hills (*Daly*); Yercaud in the Shevaroy Hills (*Henderson*); French Rocks, Madras (*Hamilton*).

Subspecies **muricola**, *Pocock*, *Jour. Bomb. N. H. Soc.* xii, p. 745, 1899.

♀. Like that of *T. sepiaris* subsp. *indicus* in colour of legs and structural characters.

♂. At once recognizable from that of the typical *T. sepiaris* and of *T. sepiaris* subsp. *indicus* by the much greater smoothness of the abdominal sterna, these plates being polished, minutely punctulated, and irregularly transversely striated, the sides only being densely punctured as in the females of *T. sepiaris*.

Loc. S. India: Trivandrum in Travancore (*Ferguson & Sullivan*).

87. **Thelyphonus cristatus**, sp. n.

♀. Colour and general characters, such as spine-armature of tibiæ, granulation of terga, etc., as in *T. sepiaris*; considerably smaller than that species; the 4th, 5th, and 6th sterna with distinct elevated median line, and all the sterna more distinctly punctured, the posterior more so than the anterior, the 7th especially being very distinctly punctured throughout. In the chelæ the anterior edge of the upper side of the trochanter is armed with only one strong tooth, the second being quite small.

Total length 26 mm.

Loc. Bengal (*Hardwicke*).

88. **Thelyphonus schnehagenii**, *Kraepelin*, *Abh. Ver. Hamb.* xv, p. 33, 1897; *id. Tierr., Scorp. etc.* p. 222, 1899.

♀. *Colour* of trunk and limbs reddish brown. *Carapace* and terga rugose, granular; median line showing only on the anterior three terga. Posterior border of 1st abdominal *sternum* transversely truncate, finely and closely punctured, especially at the sides, and furnished also with scattered larger punctures; the

* This locality for the type of *T. nigrescens* is probably erroneous.

† In the case of both subspecies, specimens that have recently moulted have the integument of both body and legs reddish brown.

rest of the sterna also finely and closely punctured, without trace of middle line. *Chela* with coxa smooth, very sparsely punctured; maxillary process not shouldered on its inner edge; trochanter armed as in *T. sepiaris*; femur moderately thickly rugose, with conspicuous spine on the upper edge in front; tibia very sparsely and coarsely punctured, the apophysis with two strong teeth on the outer border towards the tip; hand tolerably thickly and coarsely punctured, with shortly toothed inner edge. Tibia of 4th *leg* with apical spine. *Caudal filament* nearly naked.

Length 32 mm.

Loc. Burma: Rangoon (*Schnehagen*).

Genus **UROPROCTUS**, Pocock.

Uroproctus, *Pocock, A. M. N. H.* (6) xiv, p. 129, 1894; *Kraep. Abh. Ver. Hamb.* xv, p. 40, 1897; *id. Tierr., Scorp. etc.* p. 225, 1899.

A. B.

Fig. 32.—*Uroproctus assamensis.*
A. Maxillary processes of chelæ.
B. Chela of ♂.

Carapace with sharp ridge running forward on each side from the lateral eyes; median ocular tubercle high. *Maxillary process* of coxa of chela armed internally with a strong tooth. 1st abdominal *sternum* in ♂ without median groove; 2nd scarcely toothed in the middle of its hinder border. *Chelæ* in male larger than in female; tibial apophysis different in the two sexes.

Type, *U. assamensis* (Stoliczka).

Distribution. Hilly region of Assam and North-eastern Bengal.

89. **Uroproctus assamensis**, *Stoliczka, J. A. S. B.* xxxviii, pt. 2, p. 205, t. 19, fig. 1, 1869; *id. op. cit.* xlii, pt. 2, p. 133, t. 12. fig. 2, 1873; *Oates, op. cit.* lviii, pt. 2, p. 8, pl. ii, fig. 13, 1889 (Thelyphonus); *Pocock, A. M. N. H.* (6) xiv, p. 129, 1894; *Kraep. Abh. Ver. Hamb.* xv, p. 40, 1897; *id. Tierr., Scorp. etc.* p. 226, 1899 (Uroproctus): scabrinus, *Stoliczka, op. cit.* xlii, pt. 2, p. 130, t. 12, fig. 1, 1873; angustus, *Stoliczka, op. cit.* p. 134, t. 12, fig. 3 (in part; not *angustus*, Lucas): rufimanus, *Butler, A. M. N. H.* (4) x, p. 202, 1872 (nec *rufimanus*, Lucas), ♀: proscorpio, *id. ibid.* (nec *proscorpio*, Latreille), ♀: psittacinus, *id. Cist. Ent.* i, p. 129, 1873, ♂ (Thelyphonus).

♂. *Colour* black, especially on carapace and chelæ, extremities of legs reddish brown, underside of cephalothorax and abdomen rich mahogany-brown; in recently moulted specimens the whole colour is much redder. Upper side of *body* roughened with sculpturing of close-set punctures and studded with granules. First abdominal *sternum* coarsely punctured and transversely grooved, with posterior border widely rounded in the middle.

depressed posteriorly, and bearing a pair of marginal impressions; middle of 2nd sternum pale, transversely grooved, with small median tubercle; the rest of the sterna polished, punctured. *Chelæ* with coxa coarsely punctured; trochanter granular, armed below with a bifid tooth and above with 4 internal and 1 anterior tooth; femur and tibia coarsely granular above, below and externally, each armed below on the inner side with a tooth; tibia considerably thicker than femur; the apophysis long and slender, its hinder border straight, unarmed, its anterior border also nearly straight, depressed towards the extremity, which is acute and armed here and at the base with close-set teeth; hand smoother than tibia, toothed below; immovable finger short; movable finger longer, curved.

♀ with *chelæ* shorter and not distally incrassate, the hand narrower than the tibia and not wider than the femur; tibial apophysis of normal form, its anterior edge lightly convex and serrate throughout its length, posterior edge also armed with three teeth, the two edges tapering gradually to a sharp point. First abdominal *sternum* coarsely punctured in the middle and furnished with a pair of shallow impressions; 2nd not mesially grooved and not furnished with a small tubercle.

Total length up to 55 mm.

Loc. North-eastern India: Assam, Sylhet (*Stainsforth*, *Bowring*, *Austen*, *Cambridge*); Khási Hills, Sadiya (*Godwin-Austen*); Cachar.

Genus **LABOCHIRUS**, Pocock.

Labochirus, *Pocock*, *A. M. N. H.* (6) xiv, p. 132, 1894; *Kraep. Abh. Ver. Hamb.* xv, p. 42, 1897; *id. Tierr.*, *Scorp. etc.* p. 227, 1899.

Carapace with area between median and lateral eyes not crested, rounded and sloped to the inferior edge; median ocular tubercle low. *Maxillary process* armed with a strong spiniform tooth on its inner edge. *Female* with carapace weakly beaked in front; first abdominal sternum not inflated: chelæ short, normal, the maxillary process short; tibial apophysis short, subtriangular, and strongly denticulated on both edges. *Male* with carapace strongly beaked in front; first abdominal sternum swollen; chelæ very long, maxillary process slender and long, but very variable in length; tibial apophysis modified, not subtriangular, and at most denticulated at the tip.

Type, *L. proboscideus*, Butler.

Distribution. Ceylon and the Malabar coast of South India.

Synopsis of Indian Species.

Females.

a. First abdominal sternum with broad median longitudinal depression, and a low ridge on each side in front. . . . . *L. proboscideus*, p. 108.

b. First abdominal sternum with a narrow median depression and without ridges.	
a[1]. Lateral pits on first abdominal sternum deep and nearer the border............	*L. cervinus*, p. 110.
b[1]. Lateral pits on first abdominal sternum shallow and further from the border....	*L. tauricornis*, p. 109.

Males.

a. Upper side of hand with wide depression; tibia of chela with inferior anguliform prominence	*L. proboscideus*, p. 108.
b. Upper side of hand not depressed; tibia of chela without inferior prominence.	
a[2]. Anterior edge of tibial apophysis concave at base; inner edge of hand with scarce a trace of prominence	*L. cervinus*, p. 110.
b[2]. Anterior edge of tibial apophysis straight at base; inner edge of hand with distinct anguliform prominence ..	*L. tauricornis*, p. 109.

90. **Labochirus proboscideus**, *Butler, A. M. N. H.* (4) x, p. 203, pl. xiii, fig. 3, 1872 (♂); *Karsch, Berl. ent. Zeits.* xxxvi, p. 305 (Thelyphonus); *Tarnani, Horæ Soc. Ent. Ross.* xxiv, p. 533, pl. iii, fig. 9 *b*, 1890 (Hypoctonus); *Pocock, A. M. N. H.* (6), xiv, p. 132, 1894; *Kraep. Abh. Ver. Hamb.* xv, p. 42, pl. ii, fig. 43, 1897; *id. Tierr., Scorp. etc.* p. 227, 1899 (Labochirus): parvimanus, *Butler, Cist. Ent.* i, p. 130. fig. 3, 1873, ♀ (Thelyphonus).

♂. *Colour* black or deep brown above, shining mahogany-red

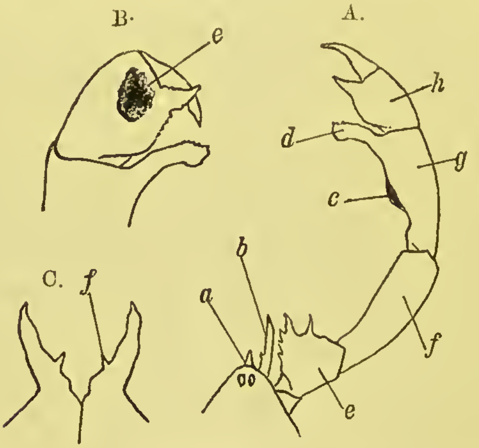


Fig. 33.—*Labochirus proboscideus.* ♂.

A. Anterior end of carapace and chela: *a*, rostrum; *b*, maxillary process; *e*, trochanter; *f*, femur; *g*, tibia; *h*, hand; *d*, tibial apophysis; *c*, prominence on lower side of tibia.
B. Extremity of tibia and hand: *e*, depression on upper side of hand.
C. Maxillary processes: *f*, spiniform tooth.

below; legs with femora and at least patellæ black or dark brown, distal segments paler, tarsi yellow. *Carapace* and terga coarsely rugose, carapace smoother in front of the eyes. First abdominal *sternum* almost smooth, sparsely punctured in the middle and

posteriorly, thickly at the sides, lightly biimpressed, its posterior border produced and widely convex in the middle; 2nd with spiniform tooth; most of the sterna nearly smooth in the middle, finely punctured; punctures becoming more numerous and close-set at the sides. *Chelæ* with coxa almost smooth, weakly punctured and striate anteriorly; *trochanter* granular, armed below with two teeth in front, and above with four internal teeth, whereof the apical is the longest, and one long anterior tooth; *femur* long, subcylindrical, more than twice as long as wide, granular below and internally, smooth and very faintly punctulate above, with a single inferior tooth; *tibia* thicker than femur, coarsely granular within, rugulose elsewhere, with a distinct anguliform prominence near the base of its lower edge in front; the apophysis not smooth, posterior border lightly concave, apex rounded and armed above with a long spike; anterior edge sinuous, convex distally and proximally, concave in the middle, and armed distally with a row of about six small close-set teeth; *hand* smooth above, with the inner edge strongly angled at base, lightly concave and toothed distally; upper side with wide subgranular depression; movable finger strongly curved, with a long, nearly straight tip. 2nd and 3rd *legs* without tibial spine.

♀. First abdominal *sternum* with wide, central depression which is bordered on each side by a low tuberculiform prominence, coarsely punctured and black behind these prominences. *Chelæ* with femur less granular, not much longer than wide; hand and tibia normal, smoother; inner edge of hand with a single tooth; two teeth on the posterior edge of the tibial apophysis behind the tip; anterior edge lightly convex and toothed throughout; movable finger evenly curved from base to tip.

Length up to about 32 mm.

Loc. Ceylon (*Templeton*, *Barnes*, *Layard*, *Jameson*); Matale (*Braine*), Kandy (*Green*).

91. **Labochirus tauricornis**, *Pocock, A. M. N. H.* (7) v, p. 295, 1900= L. cervinus (*errore*), *Pocock, Jour. Bom. N. H. Soc.* xii, p. 745, 1899.

♂. Resembling the preceding species in *colour* and most structural features, but with the abdominal *sterna* closely and finely, but very distinctly granular around the impressions and between them and the border. Easily recognizable also by the different form of the *chela*: tibia without any basal anguliform prominence below the apophysis; the latter much less strongly curved downwards, its posterior edge straight, smooth, and continued without curvature to the apex, which is acutely angular and furnished with one long tooth, and sometimes two smaller ones as well, anterior edge straight and finely serrate at the base, then strongly convex and obliquely cut away down to the apex; hand without impression at base of immovable finger, inner edge with basal constriction much shallower, and anguliform prominence much smaller than in *L. proboscideus*; movable finger evenly curved throughout its length as in *L. proboscideus* ♀, not with the apex slightly bent forwards as in the ♂ of that species.

♀. Differing from that of *L. proboscideus* in having the first abdominal *sternum* marked with a very shallow median impression in its hinder half and a pair of still shallower impressions, one on each side anteriorly, the two ridges or prominences being absent; also much less black in the posterior half; the rest of the sterna

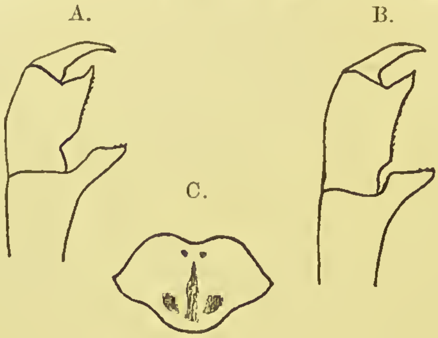


Fig. 34.

A. *Labochirus tauricornis.* Extremity of chela of ♂.
B. *Labochirus cervinus.* Extremity of chela of ♂.
C. " " First sternum of abdomen.

punctulate as in the ♂, but the punctulation spreading more inwards, so that on the 4th, 5th, and 6th sterna there is only a very narrow median smooth area, while the 7th and 8th are entirely covered with very visible punctulation.

Total length about 30 mm.

Loc. Kanara, on the Malabar coast (*Bell*).

92. **Labochirus cervinus**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 745, 1899.

♂. Allied to *L. tauricornis*, but differing in the form of the *chela*. The tibial apophysis is strongly curved downwards in its distal half, much more strongly so than in *L. proboscideus*, being bent nearly at right angles; viewed from above its posterior border appears to be straight, while its anterior border is concave at the base, strongly convex in the middle; from the median convexity the border slopes straight away down to the apex, which is armed with three teeth and is in the same straight line as the posterior border; inner edge of hand evenly concave but scarcely serrate, with shallower basal constriction than in *L. tauricornis*, armed with one or two small basal teeth, but with scarcely a trace of any anguliform prominences. First abdominal *sternum* more swollen than in *L. tauricornis*. In ♀ the 1st abdominal sternum is much larger than in either of the other species, being more tumid and marked with a pair of deeper impressions, one on each side, near its posterior border, but showing scarcely a trace of median impression.

Length up to about 30 mm.

Loc. Mangalore on the Malabar coast (*Battie*).

Genus HYPOCTONUS, Thorell.

Hypoctonus, *Thorell, Ann. Mus. Genova*, xxvi, p. 360, 1888; *id. Ann. Mus. Genova*, xxvii, p. 542, 1889; *Pocock, A. M. N. H.* (6) xiv, p. 120, 1894; *Kraepelin, Abh. Ver. Hamb.* xv, p. 43, 1897; *id. Tierr., Scorp. etc.* p. 228, 1899.

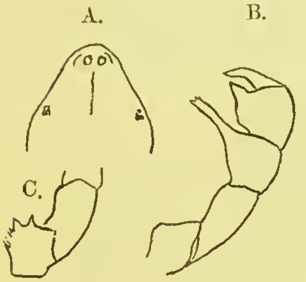


Fig. 35.—A. *Hypoctonus formosus*, anterior end of carapace. B. Ditto, chela of ♂. C. *H. oatesii*, trochanter and femur of chela of ♂.

Resembling *Labochirus* in the absence of crests between the median and lateral eyes on the carapace, but differing in the absence of a spiniform tooth on the inner border of the maxillary processes and in the male sexual characters. *Female* with first abdominal sternum not inflated; chelæ normal, short, not incrassate, the trochanter armed above on its inner side with 5 strong spiniform teeth, the tibial apophysis subtriangular and strongly serrate along both edges. *Male* with first abdominal sternum inflated, without median groove; chelæ long or incrassate; trochanter less strongly, often obsoletely toothed; tibial apophysis modified, variable in form, furnished with inferior apical lobe, its edges not evenly serrate.

Type, *H. formosus*, Butler.

Distribution. Assam, Burma, Yunnan, Borneo.

Synopsis of Indian Species.

Females.

a. First abdominal sternum with its posterior border widely rounded, not mesially produced. *H. binghami*, p. 113.

b. First abdominal sternum with its posterior border mesially produced.

- *a*[1]. First abdominal sternum with a single median pit or a pair of small adjacent pits. *H. formosus*, p. 116.
- *b*[1]. First abdominal sternum marked with a pair of large pits.
  - *a*[2]. Pits on first abdominal sternum subcircular; all the legs red . . . . *H. woodmasoni*, [p. 113.
  - *b*[2]. Pits on first abdominal sternum subcrescentic; at least the first pair of legs dark.
    - *a*[3]. Legs of 2nd, 3rd, and 4th pairs entirely red . . . . *H. saxatilis*, p. 115.
    - *b*[3]. Legs of 2nd, 3rd, and 4th pairs with femora and patellæ deep brown. . . . . . *H. rangunensis*, [p. 116.

Males.

a. Inner edge of hand with deep semicircular excavation (also as under b^1) . . . . *H. woodmasoni*, [p. 113.

b. Inner edge of hand without deep semicircular excavation.

- a^1. Chelæ long, but little incrassate; trochanter armed with five strong teeth.
  - a^2. Hand with some granules above; legs entirely red . . . . *H. binghami*, p. 113.
  - b^2. Hand quite smooth above; legs not entirely red . . . . *H. oatesii*, p. 112.
- b^1. Chelæ shorter, strongly incrassate; trochanter not or only weakly toothed above.
  - a^3. Tibial apophysis with an abrupt distal expansion which fits into an excavation behind the base of the immovable finger.
    - a^4. Apical fourth of apophysis suddenly and quadrately expanded . . . . *H. andersoni*, p. 117.
    - b^4. Extremity of apophysis gradually expanded, the expansion with rounded anterior edge.
      - a^5. Legs of 2nd, 3rd, and 4th pairs with femora and patellæ dark . . . . *H. sylvaticus*, p. 115.
      - b^5. Legs of 2nd, 3rd, and 4th pairs wholly red . . . . *H. saxatilis*, p. 115.
  - b^3. Tibial apophysis without or with only a small expansion; inner edge of hand scarcely concave at base of finger.
    - a^6. 1st leg and femora and patellæ of 2nd, 3rd, and 4th legs dark . . . . *H. rangunensis*, [p. 116.
    - b^6. 2nd, 3rd, and 4th legs wholly red, 1st leg only slightly darker . . . . *H. formosus*, p. 116.

93. **Hypoctonus oatesii**, sp. n.

♂. *Colour*. Chelæ and upper side of body black; coxæ, middle of lower side of abdomen, 1st leg, tibiæ, tarsi, and lower side of trochanter of 2nd, 3rd, and 4th legs a rich mahogany-red; femora, patellæ, and upper side of trochanter of 2nd, 3rd, and 4th legs blackish brown. Upper side of *body* densely rugose and granular, anterior end of the carapace smoother. First abdominal *sternum* almost entirely smooth, weakly punctured and striolate in the middle, depressed posteriorly; 1st, 2nd, and 3rd sterna coarsely sculptured at sides; rest of the sterna nearly smooth. *Chelæ* with coxa nearly smooth; *trochanter* weakly granular above and below, armed above with 5 strong teeth; *femur* longish, the middle of its upper surface exceeding the width of the anterior edge of the trochanter, coarsely pitted and granular above and below, and armed with a strong anterior tooth below; *tibia* smooth and sparsely punctured externally, more coarsely pitted and sparsely granular below and above, with a few denticuliform granules on its inner edge; *apophysis* much shorter than tibia, its posterior edge straight and

smooth, its anterior edge also smooth, concave in its basal, convex in its distal half, forming an ~-like curvature, the apex truncated and armed with one inferior and one median tooth; *hand* considerably longer than wide, smooth and sparsely punctured above and externally, granular internally, the inner edge with a sharp constriction in its basal half, the margin from the tip of the finger down to the constriction lightly concave and denticulate throughout its length; movable finger evenly curved. *Legs* of 3rd and 4th pairs with spine at apex of tibia. *Ommatoids* separated by a space which about equals their diameter.

Total length 27 mm.

Loc. Sylhet.

94. **Hypoctonus binghami,** *Oates, J. A. S. B.* lviii, p. 15, 1889 (Thelyphonus); *Kraep. Abh. Ver. Hamb.* xv, p. 47, fig. 50, 1897; *id. Tierr., Scorp. etc.* p. 230, 1899 (Hypoctonus): formosus, *Simon, J. A. S. B.* lvi, p. 111, 1887; *Pocock, Journ. Linn. Soc., Zool.* xxiv, p. 316, 1892 (nec *formosus,* Butler).

♂. *Colour* of upper side of body black: chelæ black or deep brown, redder at the extremity; lower surface yellowish red or reddish brown; legs entirely pale red; caudal flagellum red. Sculpturing of upper side of *body* much as in *H. oatesii.* Abdominal *sterna* finely punctulate. *Chela* with trochanter armed as in *H. oatesii,* but the spines not so strong; femur granular, long, nearly twice as long above as the anterior edge of the trochanter; tibia granular, its inner edge and basal half of apophysis granularly denticulate; apophysis much shorter than tibia, its posterior border practically straight, its anterior border shallowly and evenly concave, the extremity a little thickened, convex anteriorly and bidentate; *hand* dull, punctulate, with some large granules at the base of the immovable finger, its inner edge denticulated, convex, base of immovable finger shallowly concave. *Ommatoids* large, less than their diameter apart.

♀. First *sternal plate* of abdomen swollen in the middle, marked with three shallow impressions, its posterior border widely rounded and not mesially produced (fig. 36 F, p. 114). *Chelæ* short; upper side of humerus more weakly granular than in male, of tibia and hand not granular, sparsely punctured; tibial apophysis triangularly spiniform, evenly narrowed to a point, its posterior side armed with two subapical spinules, and one spinule followed by shorter denticuliform granules at its base on the tibia; its anterior edge denticulate throughout; inner edge of hand much straighter than in ♂.

Total length about 30 mm.

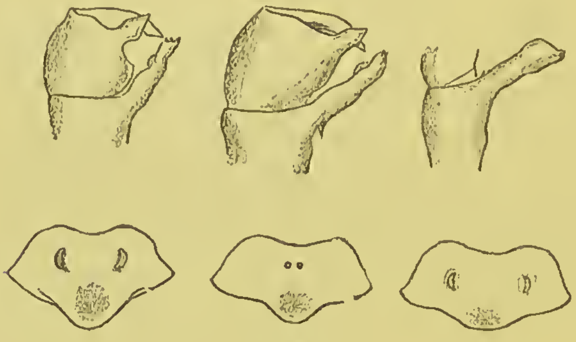
Loc. Tenasserim: Tavoy (*Moti Ram*); Reef Island, at the mouth of the Tavoy River (*Oates*); Owen Island in the Mergui Archipelago (*Anderson*).

95. **Hypoctonus woodmasoni,** *Oates, J. A. S. B.* lviii, pt. 2, p. 12, pl. ii, fig. 10, 1889; *Kraep. Abh. Verh. Hamb.* xv, p. 46, fig. 45, 1897; *id. Tierr., Scorp. etc.* p. 230, fig. 80, 1899 (Hypoctonus).

♂. *Colour* black above and on chelæ; legs and sterna red.

Sculpturing of upper side practically as in *H. oatesii.* *Sterna* also as in that species, but with the punctures a little more numerous. *Chelæ* with the spines on the lower side of the trochanter and femur much smaller; upper side of trochanter smooth, at most obsoletely spined, its anterior border straight; femur about as long above as anterior edge of trochanter, rather coarsely granular and punctured below, a few spines also on its upper inner edge, otherwise smooth, sparingly punctured; tibia with a few granules below and internally, smooth and punctured elsewhere; apophysis long and slender, almost as long as upper side of tibia, and reaching almost to tip of fingers, its posterior edge

A. B. C.



D. E. F.

Fig. 36.

A. *Hypoctonus woodmasoni*, extremity of chela of ♂. B. *H. saxatilis*, ditto. C. *H. andersoni*, tibial apophysis. D. *H. rangunensis*, first abdominal sternum of ♀. E. *H. formosus*, ditto. F. *H. binghami*, ditto.

straight and unarmed, its apex truncate and bidentate, the anterior border lightly concave in its basal and distal portions, lightly convex submesially, and armed with four denticles; hand wide, as wide as long, strongly convex and smooth above; a deep semicircular excision on its inner edge and on the base of the finger, the area behind the excision produced into a weakly denticulate rectangular prominence; immovable finger much narrower at base than in the middle. *Ommatoids* small, more than their diameter apart.

♀. Very like the female of *H. binghami*, but with the ommatoids small, more than a diameter apart; the lower side of the femur of the chela more numerously granular and punctured as well, the upper side of the trochanter without granules; the 1st abdominal sternum not widely rounded behind, but with its posterior border strongly produced into a large subquadrate lobe; the anterior half of the plate marked with a pair of subcircular pits, separated from each other by a space which distinctly excels their diameter.

Length up to about 27 mm.

Loc. Tenasserim, near Mount Mooleyit.

96. **Hypoctonus saxatilis**, *Oates, J. A. S. B.* lviii, p. 17, 1889 (Thelyphonus); *Kraep. Abh. Ver. Hamb.* xv, p. 49, 1897; *id. Tierr., Scorp. etc.* p. 232, 1899 (Hypoctonus).

♂. Resembling *H. woodmasoni* in colour, except that the legs of the first pair are dark, the tarsi alone being yellowish red, and the last abdominal sternum and the underside of the three caudal segments are also deep blackish brown in the adult. Granulation of upper side as in preceding species; *sterna* much more distinctly punctured: the 1st with the two shallow impressions deeper than in *H. woodmasoni* and transversely striate. Trochanter of *chela* weakly granular above as in *H. binghami*, obsoletely toothed as in *H. woodmasoni*; femur, tibia, and hand sculptured, and tibial apophysis as long as in the latter; posterior edge of apophysis quite smooth and straight until reaching the extremity, where it is slightly swollen and convex; anterior edge straight in the basal two-thirds of its length, and furnished with about seven small denticles, the distal third inflated but becoming narrower again at the extremity, which is truncate and scarcely toothed; hand more strongly depressed at the base of the immovable finger than in *H. woodmasoni*, its inner edge evenly convex from base of finger backwards and armed with small denticles in its distal half; immovable finger straight or lightly concave basally, convex distally.

♀. Closely allied to that of *H. woodmasoni*, but with anterior legs black, trochanter and femur of chela more granular above, and the two impressions on the first abdominal sternum longer, not circular but half-moon shaped or subcrescentic.

Total length up to about 31 mm., ♀: 25, ♂.

Loc. Upper Burma: Thayetmyo (*Macdonald*).

97. **Hypoctonus sylvaticus**, *Oates, J. A. S. B.* lviii, p. 18, 1889 (Thelyphonus): rangunensis, var. silvaticus, *Kraep. Abh. Ver. Hamb.* xv, p. 49, 1897; *id. Tierr., Scorp. etc.* p. 232, 1899 (Hypoctonus).

♂. Colouring as in *H. saxatilis*, with anterior legs dark, but with the upper and outer sides of the femora and trochanters of the 2nd, 3rd, and 4th legs brown as in *H. oatesii*. *Chelæ* with upper and under side of femur scarcely granular, only punctured; tibial apophysis shaped somewhat as in *H. saxatilis*, but with the anterior edge of the basal half with only about two small denticles, and the apical expansion much larger and involving more than the distal third of the apophysis, its thickness equal to twice the thickness of the portion immediately behind it; inner edge of hand with a much more strongly and less widely-rounded prominence in the middle of its length, and a much stronger concavity at and behind the base of the immovable finger, the external edge of which has a more strongly pronounced sigmoid curvature. In the form of the inner edge of the hand, *H. sylvaticus* lies nearly midway between

H. saxatilis and *H. woodmasoni*; but differs entirely from the latter in possessing the large expansion at the distal end of the tibial apophysis. Total length 23 mm.

Loc. Burma: Zigon and Minhla in the Tharrawaddy district (*Oates*).

98. **Hypoctonus rangunensis**, *Oates, J. A. S. B.* lviii, p. 18, 1889 (Thelyphonus); *Kraep. Abh. Ver. Hamb.* xv, p. 46, 1897; *id. Tierr., Scorp. etc.* p. 232, 1899 (Hypoctonus).

♂. *Colour* as in *H. sylvaticus*, but in other respects more nearly approaching *H. saxatilis*, the femur of the chela being granular above and below, practically as in that species. *Tibial apophysis* long as in the two species named, but different in shape, the posterior border almost entirely straight, only very slightly sinuous and unarmed; anterior border also very nearly straight, only very slightly sinuous, but armed with about half a dozen small denticles, the apex obliquely truncate, tridentate, a slight swelling on the anterior edge of the apophysis just before the apex. Inner edge of *hand* widely but not strongly convex, forming almost a straight line with the outer side of the immovable finger, which is itself almost straight, with scarcely a trace of the sigmoid curvature observable in *H. saxatilis* and *H. sylvaticus*.

♀. Very like that of *H. saxatilis*, but differing in the colour of legs; first abdominal sternum with very nearly the same shaped semilunar impressions.

Total length up to 28 mm.

Loc. Burma: Rangoon and the neighbourhood (*Oates*).

99. **Hypoctonus formosus**, *Butler, A. M. N. H.* (4) x, p. 203, pl. xiii, fig. 4, 1872; *Stoliczka, J. A. S. B.* xlii, p. 137, pl. xii, fig. 4, 1873; *Oates, op. cit.* lviii, p. 14, 1889 (Thelyphonus); *Kraep. Abh. Ver. Hamb.* xv, p. 48, 1897; *id. Tierr., Scorp. etc.* p. 231, 1899 (Hypoctonus): angustus, *Stoliczka, J. A. S. B.* xlii, pt. 2, p. 134, 1873 (in part) (Thelyphonus).

♂. *Colour* of legs as in *H. saxatilis*, except that those of the first pair, instead of having the femur, patella, and tibia black, have the patella and tibia a dark brownish red and only slightly darker than the rest of the segments. *Chelæ* most resembling those of *H. rangunensis*, but the femur very much more thickly and coarsely granular below, even more so than in *H. saxatilis*; spine on lower side of femur noticeably stronger than in *H. rangunensis*, very much stronger than in *H. saxatilis*. *Tibial apophysis* long and slender, straight and parallel-sided, without trace of apical enlargement, with three apical teeth. Inner edge of *hand* much more prominent than in *H. rangunensis*, more like that of *H. saxatilis*, but the prominence more distinctly angular, and not so rounded; immovable finger much broader at the base, almost as broad as long.

♀. First abdominal sternum very different from that of *H. woodmasoni, rangunensis*, and *saxatilis*, without any large circular or crescentic pits, but furnished in its anterior half with a pair of small round holes, sometimes sunk in a common depression,

occasionally separated by a very narrow partition which is less broad than the diameter of either hole (fig. 36 E, p. 114).

Length up to about 30 mm., ♀; 25–27, ♂.

Loc. Moulmein (*Oates*); also females of the same or of a closely allied form from Taoo, 4000 feet (*Oates*).

Subspecies **insularis**, *Oates*: Thelyphonus insularis, *Oates, J. A. S. B.* lviii, pt. 2, p. 13, pl. ii, figs. 7–8, 1889: Hypoctonus formosus, var. insularis, *Kraep. Abh. Ver. Hamb.* xv, p. 48, 1897; *id. Tierr., Scorp. etc.* p. 231, 1899.

Total length of adult ♂ and ♀, 33–36 mm.

Loc. Double Island in the mouth of the Moulmein River (*Oates*).

Representatives of this form, which was regarded by Mr. Oates as a valid species, were collected in immense numbers in Double Island. Apart from its greater average size, however, there appears to be no constant structural character by which *insularis* may be distinguished from the mainland form *formosus*.

The following species is known to me only from the description given by Mr. Oates, which is here reproduced:—

100. **Hypoctonus andersoni**, *Oates, J. A. S. B.* lviii, pt. 2, p. 11, pl. ii, fig. 12, 1889 (Thelyphonus); *Kraep. Abh. Ver. Hamb.* xv, p. 49, 1897; formosus, var. andersoni, *id. Tierr., Scorp. etc.* p. 231, 1899 (Hypoctonus).

♂. *Colour* dark red, legs paler red. *Chelæ* smooth, with a very few minute punctures; coxæ normal, trochanter with a few obsolete teeth on the anterior and lateral edge, and two strong spines below; femur with a sharp tooth on its lower surface; tibia with an indistinct spine on the lower edge. *Tibial apophysis* (fig. 36 C, p. 114) about the same length as tibia, perfectly cylindrical for three-quarters of its length, suddenly widened out on its terminal quarter to half as wide again as the cylindrical portion and terminating in a single recurved spine. *Hand* feeble, narrower than tibia, interior edge toothed and hairy, exterior edge of the fixed finger serrated; movable finger curved, sharply pointed. *Carapace* densely granular except on the portion between the lateral and central eyes, which is smooth. First abdominal *sternum* in female longer than in male and pointed posteriorly.

Total length about 25 mm.

Loc. Upper Burma: Pudeepyoo Mountain, and the second defile of the Irawadi River (*Anderson*).

Judging from the description and figure of the tibial apophysis, this undoubtedly valid species is allied both to *H. saxatilis* and *H. sylvaticus*, but cannot be confounded with either on account of the red colour of the first leg and the quadrate shape of the expansion of the tibial apophysis. It has been provisionally inserted under heading a^3 in the table on p. 112 with *H. sylvaticus* and *H. saxatilis*.

Suborder *TARTARIDES.**

Tartarides, *O. P. Cambridge, A. M. N. H.* (4) x, p. 410, 1872.

Cephalothorax covered above by two plates—a posterior, smaller, wider than long, representing the dorsal elements of the 5th and 6th somites, which bear the 3rd and 4th pairs of legs; and an anterior, much longer than wide, representing the dorsal elements of the anterior four somites. *Eyes* sometimes absent, at most represented by a single pale spot or ocellus on each side. *Chelæ* or *palpi* sub-prehensile, sub-pediform, not chelate, folding in a vertical plane; 4th segment (*tibia*) without spiniform apophysis, 5th segment long, cylindrical; 6th segment (*tarsus*) shorter, conical, armed

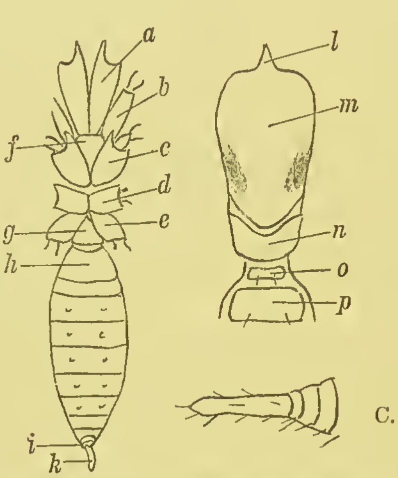


Fig. 37.—*Schizomus crassicaudatus.*

A. Lower side of cephalothorax and abdomen. *a*, coxa of chela; *b*, of first leg; *c*, of second leg; *d*, of third leg; *e*, of fourth leg; *f*, prosternum; *g*, metasternum; *h*, first sternum, *i*, last sternum of abdomen; *k*, caudal sclerite.
B. Carapace and anterior end of abdomen. *m*, anterior plate of carapace; *n*, posterior plate; *l*, rostrum; *o*, first, *p*, second tergum of abdomen.
C. Posterior end of abdomen.

with a pair of spiniform processes; claw long, not fused to tarsus. *Legs*: 2nd with its tarsus 8-segmented, 2nd segment very long, more than half the length of the succeeding six; coxa of 2nd leg armed in front with a long spiniform process; femur of 4th leg very thick; 6th segment (*protarsus*) of 2nd, 3rd, and 4th legs subequal to the 5th (*tibia*) or at all events not much shorter. *Abdomen* with its postanal sclerite short and unsegmented. No distinct pulmonary apertures behind the 1st and 2nd sterna.

* Proposed as a family-name by Cambridge, and elevated to the rank of a 'tribe' by Thorell (Ann. Mus. Genova, xxvi, p. 358).

Sexual characters. Males, where known, differing from females in having the postanal sclerite expanded and spatulate in its distal half, this organ in the females being unexpanded and subcylindrical; chelæ in male also frequently larger than in the female and armed with spines.

Habits. Occur beneath stones, the débris of leaves, &c.

Distribution. Tropical West Africa; Ceylon, Burma, and the Bismarck Archipelago (New Britain); California; Venezuela. Also introduced with exotic plants into conservatories in Europe.

Further collecting will no doubt fill up the apparent gaps in the distribution, and greatly increase our knowledge of the range of this interesting little group.

Family HUBBARDIIDÆ.

Hubbardiidæ, *Cook, Proc. Ent. Soc. Wash.* iv, p. 249, 1899.
Schizonotidæ, *Thorell, Ann. Mus. Genova,* xxvi, p. 358, 1888.

Characters of the suborder.

The Indian genera may be tabulated as follows:—

a. Posterior plate of carapace undivided or at most with a narrow sutural line .... SCHIZOMUS, p. 119.

b. Posterior plate of carapace consisting of a distinct right and left half, or divided by a narrow pellucid longitudinal area .... TRITHYREUS, p. 121.

Genus SCHIZOMUS, Cook.

Nyctalops, *O. P. Cambridge, A. M. N. H.* (4) x, p. 410, 1872 (nom. præocc.).
Schizonotus, *Thorell, Ann. Mus. Genova,* xxvi, p. 358, 1888; *id. op. cit.* xxvii, p. 554, 1889; *Pocock, A. M. N. H.* (6) xi, p. 4, 1893; *Kraep. Abh. Ver. Hamb.* xv, p 51, 1897; *id. Tierr., Scorp. etc.* p. 233, 1899 (nom. præocc.).
Schizomus, *Cook, Proc. Ent. Soc. Wash.* iv, p. 249, 1899.

Anterior dorsal plate of *cephalothorax* elongate, broad in front, narrowed behind, its anterior border armed with a long sharp beak-like process the length of which is greater than its basal width; posterior plate not divided into a distinct right and left half separated by a definite pale membranous area, but uniformly pigmented throughout and at most only marked with a very fine median sutural line; no additional sclerites intercalated between this plate and the anterior portion of the carapace. No *eyes*. *Chelæ* of ♂ dentate beneath; caudal sclerite cylindrical at base, its distal half expanded into a heart-shaped plate: *chelæ* of ♀ unarmed beneath; caudal sclerite irregularly cylindrical throughout.

Type, *S. crassicaudatus*, O. P. Cambr.

Distribution. Ceylon.

101. **Schizomus crassicaudatus**, *O. P. Cambr. A. M. N. H.* (4) x, p. 411, t. xxii, fig. 1, 1872 (Nyctalops); *Thorell, Ann. Mus. Genova*, xxvi, p. 358, 1888; *Kraep. Abh. Ver. Hamb.* xv, p. 52, figs. 1*b* & 56*a*, 1897; *id. Tierr., Scorp. etc.* p. 234, figs. 82-83, 1897 (Schizonotus), ♂.

S. tenuicaudatus, *O. P. Cambr. A. M. N. H.* (4) x, p. 412, t. xxii, fig. 2, 1872 (Nyctalops); *Thorell, Ann. Mus. Genova*, xxvi, p. 358, 1888; *Kraep. Abh. Ver. Hamb.* xv, p. 52, 1897; *id. Tierr., Scorp. etc.* p. 234, 1899 (Schizonotus); *Pocock, A. M. N. H.* (6) xi, p. 4, 1893 (Tripeltis), ♀.

♂. *Colour* yellowish brown; carapace darker and duller in hue than the rest of the body. *Carapace* and tergal plates rugulose, covered with squamiform markings; each tergum furnished on its posterior edge with a pair of bristles, one on each side of the posterior margin, the bristles becoming more numerous on the posterior plates. *Sterna* also furnished with symmetrically disposed bristles. *Chelæ*

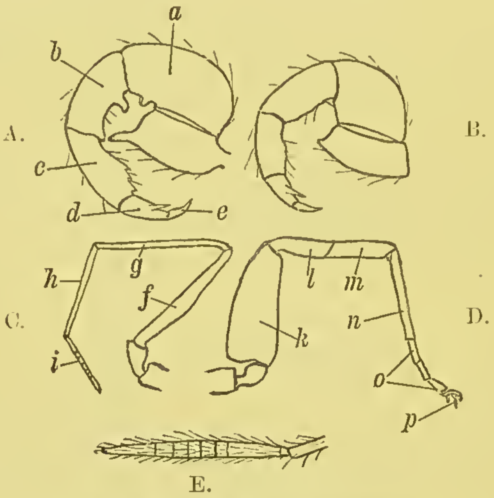


Fig. 38.—*Schizomus crassicaudatus.*

A. Chela of ♂. *a*, femur (3rd segment); *b*, 4th segment; *c*, tibia (5th segment) *d*, hand (6th segment); *e*, claw.
B. Chela of ♀.
C. First leg. *f*, femur; *g*, patella; *h*, tibia; *i*, tarsus.
D. Fourth leg. *k*, femur; *l*, patella; *m*, tibia; *n*, protarsus; *o*, tarsus; *p*, claws.
E. Tarsus of 1st leg.

massive, the trochanter long, armed on its inferior distal angle with a strong spiniform process; femur very thick, strongly convex above, armed below with two tubercles; tibia (4th segment) much less massive than the femur, armed at the base below with a large long tooth-like tubercle; 5th segment (=hand of *Thelyphonus*) also elongate, lightly convex above, its lower surface armed with small setiferous tubercles; 6th segment (tarsus = movable finger of *Thelyphonus*) armed with a pair of spiniform processes. 1st *leg* (not including coxa) not longer than body, its tibia reaching to end of

chela when extended; 2nd tarsal segment long, longer than the three succeeding segments, 3rd segment wider than long, 4th about twice as long as 3rd; 5th, 6th, and 7th of approximately the same length as the 4th, and about as long as wide; 8th long, considerably longer than the preceding two, acuminate. Femur of 1st leg a little thickened; femur of 4th enormously thickened, especially at the base, of 3rd less thickened than 4th, of 2nd less thickened than 3rd. *Caudal sclerite* with posterior heart-shaped expansion, the narrow portion of the expanded portion directed posteriorly.

♀. Resembling ♂ in general features, but with the apex of the trochanter of the chela rectangular, not produced into a long spine, and no spines or tubercles on the underside of the femur, tibia, or protarsus; caudal process cylindrical, without cordate expansion.

Total length up to about 6 mm.

Loc. Ceylon: in the Botanical Garden at Peradeniya (*Thwaites*).

Genus TRITHYREUS, Kraepelin.

Tripeltis, *Thorell, Ann. Mus. Genova,* xxvii, p. 554, 1889; *Kraep. Abh. Ver. Hamb.* xv, p. 52, 1897 (nom. præocc.).

Trithyreus, *Kraep. Tierr., Scorp. etc.* p. 234, 1899 (March).

Triplomus, *Cook, Proc. Ent. Soc. Wash.* iv, pp. 250 & 255, 1899 (April).

Differs from *Schizomus* in that the posterior dorsal plate of the cephalothorax is not uniformly chitinized and pigmented throughout, but is either completely divided into a right and left quadrate portion (according to Thorell and Kraepelin), or is, at all events, marked with a narrow, pellucid, unpigmented submembranous median area, impressed with the sutural line observable in *Schizomus*. In all the known specimens, which are perhaps females, the chelæ are unarmed, and the caudal sclerite is cylindrical as in the female of *Schizomus crassicaudatus*.

Distribution. Ceylon; Burma; also Bismarck Archipelago.

Synopsis of Indian Species.

a. Posterior dorsal plate of cephalothorax marked with a narrow median suture; apex of trochanter of chela rectangular, scarcely produced . . . . *T. suboculatus*, p. 121.

b. Posterior dorsal plate of cephalothorax with a broad median divisional line; trochanter of chela apically produced and upturned (according to Kraepelin and Thorell).

  *a*¹. Without eyes; chelæ one and a half times the length of the cephalothorax . . *T. grassii*, p. 122.

  *b*¹. With a pair of eye-spots; chelæ a little longer than the cephalothorax . . . . *T. cambridgii*, p. 122.

102. **Trithyreus suboculatus**, sp. n.

Resembling the female of *Schizomus crassicaudatus* in general features. *Colour* a yellowish olive-green on the carapace and abdomen, legs and chelæ paler, nearly flavous. Anterior end of

carapace armed with a short rostrum, the basal width of which is greater than its length. On each side of its anterior portion there is a pale irregular-shaped patch representing an eye, but showing no traces of a distinct lens. *Terga*, like the carapace, coriaceous, each furnished with a pair of symmetrically disposed bristles, one on each side of the middle, the 8th and 9th also with a bristle on the posterior lateral angle, the median bristles on the 9th much farther apart than those of the 7th. *Sterna* with symmetrically disposed bristles; bristles on the posterior abdominal somites very long. *Chelæ* of the same general form as in the female of *S. crassicaudatus*, but weaker, being relatively both shorter and thinner, the femur especially being not nearly so thick; trochanter not strongly produced distally, its distal angle rectangular. First *leg* much longer than in *S. crassicaudatus*, longer than body, when the appendage is extended the tip of its femur almost reaches the tip of the extended chela; tarsal segments not very different from those of *S. crassicaudatus*. Length of body about 4 or 4·5 mm.; of 1st leg about 6·5 mm.

A.

B.

C.

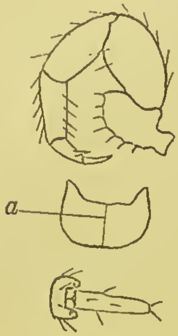


Fig. 39.
Trithyreus suboculatus.

A. Chela.
B. Posterior plate of carapace: *a*, sutural line.
C. Caudal skeletal plate.

Loc. Ceylon: Punduloya (*Green*).

103. **Trithyreus grassii**, *Thorell, Ann. Mus. Genova*, xxvii, p. 554, t. 5, fig. 1, 1889; *Kraep. Abh. Ver. Hamb.* xv, p. 53, t. ii, fig. 58 *b*, 1897 (Tripeltis); *id. Tierr., Scorp. etc.* p. 235, 1899 (Trithyreus).

Colour of body brown above: legs paler. No trace of *eyes* on carapace; *chelæ* one and a half times as long as carapace; trochanter with strongly convex inferior border, produced anteriorly into an acutely angular process, of which the inferior border is convex and the superior concave. First *leg* nearly twice as long as body. Other characters apparently much as in the preceding species. Length of body about 7 mm., of 1st leg 13.

Loc. Burma: Teinzo (*Fea*).

104. **Trithyreus cambridgii**, *Thorell, Ann. Mus. Genova*, xxvii, p. 559, 1889; *Kraep. Abh. Ver. Hamb.* xv, p. 53, 1897 (Tripeltis); *id. Tierr., Scorp. etc.* p. 234, 1899 (Trithyreus).

Closely resembling *T. grassii*, of which this is perhaps the young. *Colour* paler, more yellowish green; *carapace* furnished on each side with a round eye-spot; *chela* only a little longer than carapace. First *leg* (according to figure) shorter than body. Length about 3·5 mm.

Loc. Burma: Prome (*Fea*).

Order AMBLYPYGI.

Carapace much wider than long, transversely reniform, with convex anterior and lateral and concave posterior border; furnished in front with a pair of median eyes, and a cluster of lateral eyes on each side. *Sternal area* broad, subcircular; membranous,

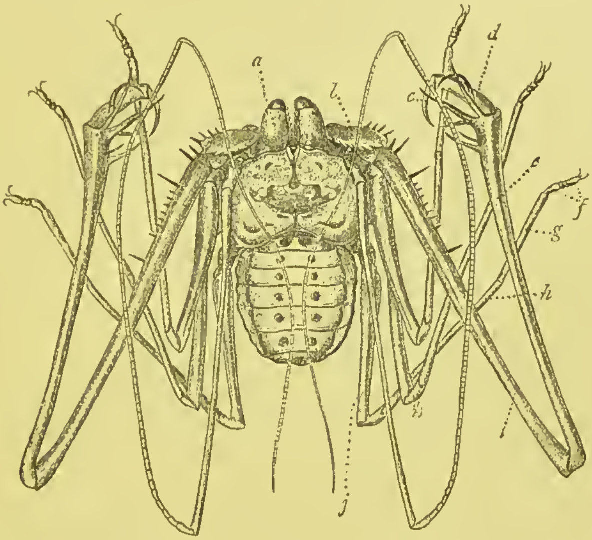


Fig. 40.—*Phrynichus phipsoni*, ♂.

a, mandible; *l*, trochanter; *i*, femur; *e*, tibia; *d*, hand; *c*, claw of chela: *j*, femur; *k*, patella; *h*, tibia; *g*, protarsus; *f*, tarsus of leg.

but strengthened with four median sclerites, the anterior (*labium* or *prosternum*) long and pointed, projecting between the bases of the chelæ, the posterior (*metasternum*) lodged between the coxæ of the 4th pair of legs. Coxæ of *chelæ* and *legs* arranged radially round the sternum, those of the 2nd and 3rd pairs widely separated. Chelæ prehensile, subchelate, closing in a horizontal plane, their basal segments freely articulated to the membrane at the sides of the anterior sternal sclerite (*prosternum*, *labium*); 3rd (*femur*) and 4th (*tibia*) segments long and strong, strongly spined; 5th segment (*hand*) small, spined above and below; 6th segment (*finger*) hairy, short, and ending in a long smooth claw,

which is usually united to it without trace of suture. *Legs* of 1st pair very long and antenniform; the segments on the distal side of the femur forming a long, many-jointed flagellum. Remaining legs long and slender; 4th segment (*patella*) very short, 5th (*tibia*) long and slender, often segmented; tarsi consisting of four or five segments; the apical segment armed with two claws, and often provided beneath with a membranous sucker (*pulvillus*). *Abdomen* oval, segmented, covered above by 12 terga, and below by 11 sterna as in the *Uropygi*, but much shorter than in that group, the posterior segments very small, the last tergum forming a movable flap over the anus; no postanal sclerite. *Generative organs* opening behind the sternum of the 2nd abdominal somite as in the *Uropygi*, that is to say, behind what is described as the 1st sternum. Two pairs of *breathing-organs*, consisting of pulmonary sacs, the anterior pair placed in the same transverse line as the generative aperture, the posterior pair opening behind the 2nd abdominal sternum.

Habits. These Arachnida, which are in many respects intermediate between the Whip-Scorpions and the true Spiders, much resemble the former in habits, being found under stones, fallen tree-trunks, or in the crevices of rocks, of termites' nests, &c. They do not, however, dig burrows for themselves. Many of the species of *Charontidæ* are to be met with in caves, on the walls and roofs of which the sucker-like pulvillus enables them to maintain a secure hold. The eggs are carried attached to the underside of the abdomen, as in the Whip-Scorpions.

Distribution. Africa south of the Sahara, S. Arabia, and the Seychelles; Oriental Region from India, Ceylon, and Siam eastwards over the whole of the Indo- and Austro-Malayan area as far as Fiji; South and Central America northwards into Texas and Lower California.

The Indian genera are referable to two families, which may be tabulated as follows:—

a. Sternal plates large; no pulvillus on tarsus ...... **Phrynichidæ.**
b. Sternal plates small; a distinct pulvillus on tarsus. **Charontidæ.**

Family PHRYNICHIDÆ.

Sternal plates of large size, much wider than long, the labial process of the anterior plate rising abruptly from the middle of its anterior border. Tibia of 4th *leg* composed of one or two segments; two in the African genus *Damon*, one in the Indian

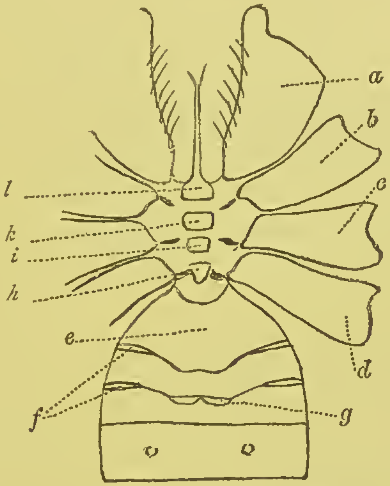


Fig. 41.—Lower side of cephalothorax and of anterior end of abdomen of *Phrynichus lunatus*.

a, coxa of chela; *b*, *c*, *d*, coxæ of 2nd, 3rd, and 4th legs; *e*, first abdominal sternum; *f*, apertures of pulmonary organs; *g*, semilunar lobes on 2nd abdominal sternum; *h*, metasternal, *i*. *k*, mesosternal, *l*, prosternal plates.

genus *Phrynichus*. Distal spines on upper side of tibia of *chela* directed obliquely forwards, and overlapping the base of the hand. No *pulvillus* or sucker beneath claws. *Tarsi* consisting of three segments.

Distribution. Africa south of the Sahara; South Arabia, India, Ceylon, and Siam.

Genus **PHRYNICHUS**, Karsch.

Phalangium, *Linn. Syst. Nat.* ed. x, p. 618, 1758 (in part).
Tarantula, *Fabr. Ent. Syst.* ii, p. 432, 1793 (in part); *Kraep. Abh. Ver. Hamb.* xiii, p. 9, 1895.
Phrynus, *Lamarck*, *Syst. Anim.* p. 175, 1801 (in part); *Latreille*, *Hist. Nat. Crust. Ins.* iii, p. 48, 1812; *C. Koch*, *Arachn.* x, p. 35, 1843 (in part).

Phrynichus, *Karsch, Arch. Nat.* xlv, p. 195, 1879; *Pocock, A. M. N. H.* (6) xiv, p. 294, 1894; *Kraep. Tierr., Scorp. etc.* p. 236, 1899.

Phrynischus, *Simon, Ann. Soc. Ent. Fr.* lxi, p. 50, 1892.

Characters as under the heading *Phrynichidæ.* Recognizable from the African genus *Damon* by the presence of only one long spine on the upper side of the hand and by having the tibia of the 4th leg undivided.

Type, *P. lunatus*, Pallas.

Distribution. East Africa, Arabia, Western India and Siam.

Synopsis of Indian Species.

a. Adult with three long spines at distal end of tibia of chela; under side of hand smooth .... *P. phipsoni*, p. 127.

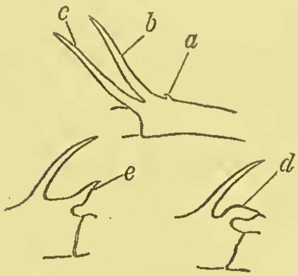
b. Adult with two long spines at distal end of chela above; under side of hand with irregular rows of granules.

  *a*¹. Of large size (25 to 35 mm. long); second sternum of abdomen with pair of lobes .... *P. lunatus*, p. 126.

  *b*¹. Of small size (up to 15 mm.); second sternum without pair of lobes .... *P. pusillus*, p. 128.

105. **Phrynichus lunatus**, *Pallas, Spic. Zool.* ix, p. 35, t. iii, figs. 3–6, 1772 (Phalangium); *Fabr. Ent. Syst.* ii, p. 433, 1793 (Tarantula): ceylonicus, *C. Koch, Arachn.* x, p. 35, fig. 776, 1843 (Phrynus): reniformis, *Linn. Syst. Nat.* ed. x, p. 619, 1758, in part (Phalangium); *Karsch, Arch. Nat.* xlv, p. 195, 1879; *Kraep. Abh. Ver. Hamb.* xiii, p. 10, 1895 (Tarantula); *id. Tierr., Scorp. etc.* p. 237, 1899 (Phrynichus).

A.



B. C.

Fig. 42.—A. Extremity of tibia of chela of *Phrynichus lunatus*: *a*, rudiment of first spine; *b*, second, *c*, third spine.
B. Extremity of tibia of chela of *P. lunatus* from below: *e*, distal spine.
C. Ditto of *P. phipsoni*: *d*, distal spine.

♀. *Colour* nearly black or reddish brown, with three grey spots on the upper side of the femora of the legs; much paler in recently-moulted specimens. *Carapace* and *terga* granular throughout; *sterna* smooth, obsoletely punctured; 1st furnished with a pair of longitudinally subcrescentic depressions, the middle of its posterior border lightly concave and fringed with red hairs; middle of posterior border of 2nd also lightly concave and furnished with a pair of chitinous lobes which meet in the middle line. *Chelæ* with coxal segment granular below, smooth in the middle; *trochanter* with upper surface bordered behind with a crest of

spines two or more rows deep, three of the spines of the front row much larger than the rest; *femur* long, cylindrical, a little more than three times the median length of the carapace, but less than twice its width, coarsely granular above, spined in front above and below; *tibia* about as long as the femur, coarsely granular, armed at the distal end above with two long spines in the adult, three in the young, and on the underside at the apex with two smaller spines, the distal the smaller of the two, dentiform and directed obliquely downwards and forwards; *hand* smooth externally and internally, granular above and below, the lower edge being furnished throughout its length with two irregular rows of coarse granules, armed above and below with a single long spine, and also with a tubercle on its upper side at the base of the spine. Second abdominal *sternum* furnished with a pair of semilunar lobes; first sternum transversely truncate in the middle of its posterior border and furnished with a fringe of red hairs.

♂. First *abdominal sternum* widely rounded posteriorly and not hairy. *Chelæ* much longer than in ♀; the trochanter and femur generally much more hairy and much less strongly spined; the femur nearly four times the median length of the carapace.

Young much smoother than adult, more varied in colouring; the chelæ considerably shorter, the tibia armed distally above with three long spines, the first becoming gradually smaller with successive moults until it is ultimately reduced to a mere tubercle.

Total length up to about 30–35 mm.

Loc. Ceylon: Kandy (*Yerbury & Green*).

106. **Phrynichus phipsoni**, *Pocock, A. M. N. H.* (6) xiv, p. 295, pl. viii, fig. 4, 1894.

♀. Size, colour, and general characters as in *P. lunatus*, from which this principally differs in the permanent retention of characters which appear in the young but are lost in the adult of that species. For example, the first of the three large spines on the upper side of the apex of the tibia of the chela is found in adult individuals of *P. phipsoni*, and is about half the length of the others; on the lower side of the tibia in the distal fourth of its length behind the two apical spines there is another spine, which is always longer and sometimes considerably longer than the rest; the granulation of the chelæ is coarser and less close-set; the underside of the hand is smooth or almost smooth, with at most the merest trace of a few granules; and the distal inferior tibial spine is differently shaped and less erect, its inferior edge being very decidedly convex from base to tip, not straight with a median sinuosity as in *P. lunatus*, and its upper edge lightly concave, without any basal convexity.

Total length 28 mm

Loc. Bombay (*Moore & Phipson*); Trivandrum in Travancore (*Ferguson*).

107. **Phrynichus pusillus**, *Pocock, A. M. N. H.* (6) xiv, p. 296, 1894.

Closely allied to *P. lunatus*, but much smaller and much more coarsely granular than tho adults of that species, the carapace being beset with large granules and the terga sparsely covered with them, about twenty being scattered over the surface and twenty arranged along the posterior edge, the interstices being very visibly and finely granulated. The integumental folds of the 2nd abdominal sternum obsolete.

Total length of ♂ and ♀ up to 15 mm.

This species is assumed by Kraepelin to be based upon young examples of *P. lunatus*. Young specimens of the latter, however, resembling *P. pusillus* in size, may be at once recognized by the much finer granulation of the integument, the presence and large size of the third tibial spine of the chela, the much shorter chelæ, and the presence of the semilunar lobes on the 2nd abdominal sternum.

Loc. Ceylon: Punduloya (*Green*).

Family CHARONTIDÆ.

Anterior *sternal plate* lanceolate, evenly narrow from base to point, without any basal plate-like expansion; median and posterior sternal plates small, subcircular. Tibia of the 4th *leg* consisting of four or three segments. Distal spines on upper side of tibia of *chela* directed inwards and scarcely overlapping the base of the hand. *Tarsi* consisting of five segments; the distal with pulvillus beneath the two claws.

Distribution. Seychelles; Burma, Andaman Islands, Philippine Islands; and over the whole of the Indo- and Austro-Malayan area as far as the Solomon Islands.

Synopsis of Indian Genera.

a. Tibia of chela slender; hand armed above and below with one long basal spine; that on the upper side double and with a few small spines between it and the finger .... STYGOPHRYNUS, p. 129.

b. Tibia of chela wide; upper side of hand with two long spines, under side with one long distal spine; no smaller spines.

a[1]. Tibia of 4th leg consisting of three segments .... CATAGEUS, p. 130.

b[1]. Tibia of 4th leg consisting of four segments .... SARAX, p. 131.

A.
B.
C.

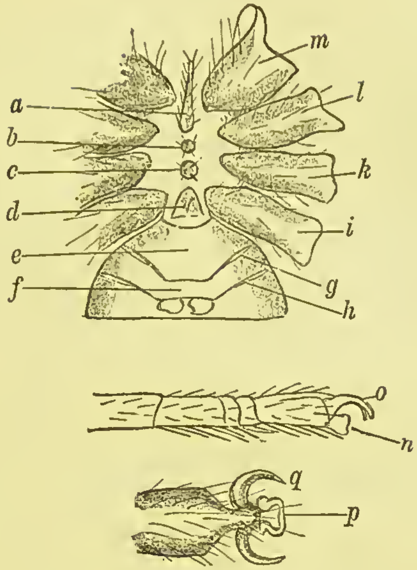


Fig. 43.—*Sarax sarawakensis.*

A. Lower side of cephalothorax and of anterior end of abdomen: *a*, prosternal, *b*, *c*, mesosternal, and *d*, metasternal plates; *e*, 1st, and *f*, 2nd abdominal sternum; *g* & *h*, apertures of pulmonary sacs; *i*, coxa of 4th, *k*, coxa of 3rd, *l*, coxa of 2nd leg; *m*, coxa of chela.
B. Tarsus of 4th leg: *o*, claws; *n*, pulvillus.
C. Upper view of extremity of tarsus: *q*, claw; *p*, pulvillus.

Genus **STYGOPHRYNUS**, Kraepelin.

Charon, *Thorell, Ann. Mus. Genova*, xxvii, p. 538, 1889 (*not* Charon *of Karsch*).
Stygophrynus, *Kraepelin, Abh. Ver. Hamb.* xiii, p. 44, 1895; *id. Tierr., Scorp. etc.* p. 248, 1889.

Only one long spine on the upper and lower side of the *hand*, but the spine on the upper side with a slender supplementary spine rising from the base of its posterior surface; distal to the long spine, both above and below, are a few, about three, small spines. Claw not fused with finger, but separated by a distinct sutural joint. Tibia of chela moderately wide; its upper edge furnished with seven spines, of which the 4th, 5th, and 6th from the distal end are subequal, very long and slender and longer than the width of the tibia (fig. 44 A, B). Tibia of 4th *leg* consisting of four segments. Second abdominal *sternum* with distinct semicircular lobes.

Type (and only known species), *S. cavernicola*.
Distribution. Burma.

108. **Stygophrynus cavernicola**, *Thorell, Ann. Mus. Genova*, xxvii, p. 538, 1889 (Charon); *Kraepelin, Abh. Ver. Hamb.* xiii, p. 44, 1895; *id. Tierr., Scorp. etc.* p. 248, 1899 (Stygophrynus).

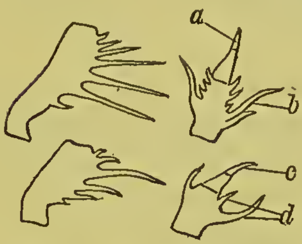
Colour yellowish. *Carapace* smooth, not granular; frontal spine projecting forwards; median ocular tubercle close to the anterior edge of the carapace. Femur of *chela* armed on its upper border with 6–7 spines, with granules between them; underside also with 6–7 spines, of which the basal two are the longest; spines on upper side of tibia of chela very long, the sixth from the apex the longest; the under surface of the tibia with about 7 spines and 3 or 4 spinules between them. Length up to 24 mm.

Loc. Moulmein. Specimens taken in the Farm Caves (*Fea*).

Genus CATAGEUS, Thorell.

Catageus, *Thorell, Ann. Mus. Genova,* xxvii, p. 530, 1889.
Catagæus, *Kraepelin, Abh. Ver. Hamb.* xiii. p. 47, 1895.
Catagius, *id. Tierr., Scorp. etc.* p. 251, 1899.

A. B.



C. D.

Fig. 44.—A. Tibia of chela of *Stygophrynus cavernicola*.
B. Lower side of hand of same: *a*, articulated claw; *b*, spine on upper side of hand.
C. Tibia of chela of *Catageus pusillus*.
D. Lower side of hand of same: *c*, claw; *d*, spines on upper side of hand.

Upper side of *hand* with two separated spines, of which the distal is the shorter; no spines distal to them; lower side of hand with one spine at the distal end. Tibia of *chela* very wide, its upper edge with 5 long or moderately long spines, two short spines distal to the longest, which is thus the median spine of the series. Tibia of *4th leg* consisting of only three segments. Second abdominal *sternum* without pair of semicircular marginal lobes.

Type (and only known species), *C. pusillus*.

Distribution. Burma.

109. **Catageus pusillus**, *Thorell, Ann. Mus. Genova*, xxvii, p. 531, 1889; *Kraepelin, Abh. Ver. Hamb.* xiii, p. 47, 1895 (Catagæus); *id. Tierr., Scorp. etc.* p. 251, 1899 (Catagius).

Colour: carapace reddish brown; abdomen brownish grey, with clearer spots. *Carapace* rounded, finely granular. *Terga* finely granular. Femur of *chela* armed above and below with 3 spines; tibia with 5 spines above and 2 below, of which the distal is the longest. *Legs* smooth; proximal tarsal segment much longer than the remaining four segments taken together. Total length up to about 8 mm.

Loc. Burma: Moulmein (*Fea*). Specimen captured in the Farm Caves.

Genus SARAX, Simon.

Charon, *Thorell, Ann. Mus. Genova,* xxvi, p. 354, 1888 (*nec Karsch*).
Sarax, *Simon, Ann. Soc. Ent. Fr.* lxi, pp. 43 & 48, 1892; *Kraepelin, Abh. Ver. Hamb.* xiii, p. 45, 1894; *id. Tierr., Scorp. etc.* p. 250, 1899.

Hand armed above with two separated long spines, of which the distal is the longest; no small spines distal to them. Tibia of *chela* wide, armed above with 8 spines, of which the 2nd from the distal end is the longest. Tibia of *4th leg* consisting of four segments. Second abdominal *sternum* with two subspherical lobes on its hinder border.

Type, *S. brachydactylus*, Sim. Two species known.

Distribution. Andaman Islands, Singapore, Borneo, Philippine and Solomon Islands.

110. **Sarax sarawakensis**, *Thorell, Ann. Mus. Genova,* xxvi, p. 354, 1888 (Charon); *Kraepelin, Abh. Ver. Hamb.* xiii, p. 45, 1895 (in part); *id. Tierr., Scorp. etc.* p. 251, 1899 (Sarax).

Colour a tolerably uniform reddish brown, sometimes marked with black; legs and abdomen paler. *Carapace* rounded in front, the sulci deep, finely granular. *Terga* finely granular. Femur of *chela* armed with 3 or 4 spines above, the basal the longest, the distal the smallest, minute; on the under side with 4 spines, the basal small and directed inwards, the 2nd the longest; *tibia* armed above with 5 spines, below with 4, of which the proximal and distal are minute. Length up to about 9 mm.

Loc. Table Island, Andamans (*Oates*); also occurring in Singapore, Borneo, New Guinea, aud the Solomon Islands.

Specimens (♂ ♀) from the Andaman Islands were captured by Mr. E. W. Oates beneath stones at low water on the coast of Table Island.

Order SOLIFUGÆ.

Integument richly clothed with hairs which are mostly soft and silky on the abdomen, stiff and erect elsewhere, many of them taking the form of long tactile bristles or of longer or shorter spines.

Carapace segmented, consisting of a large anterior head-shield (the head), behind which on each side are two narrow skeletal pieces representing the tergal elements of the somites bearing the 1st and 2nd legs, and of two large subquadrate plates, which are the terga of the somites bearing the 3rd and 4th pairs of legs.

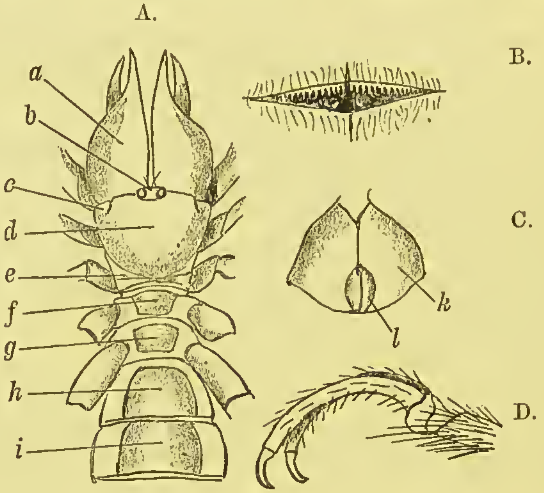


Fig. 45.—A. Anterior extremity of *Galeodes* (♀) from above. *a*, mandible; *b*, ocular tubercle; *c*, buttress to which mandible is articulated; *d*, head; *e*, remains of terga of 3rd and 4th somites, bearing 1st and 2nd pairs of legs; *f*, *g*, terga of somites bearing 3rd and 4th pairs of legs; *h*, *i*, 1st and 2nd abdominal terga.
B. Abdominal stigma showing *serrulæ*.
C. First abdominal sternum of ♂, showing *k* lateral and *l* median plates.
D. Extremity of tarsus and claws of 4th leg.

In the middle of the anterior border of the head is the ocular tubercle bearing a pair of large eyes; lateral eyes obsolete *. On each side of the head there is a distinct buttress to which the mandible is articulated. *Mandibles* projecting forwards, very large, consisting of two segments; the basal segment is swollen and bears in front a compressed but strong, toothed process, the *upper jaw*,

* Traces of the lateral eyes have been found at the sides of the head. These organs, however, are neglected in systematic description.

which ends in an apically pointed *fang.* The distal segment or *lower jaw*, also toothed and terminating in a fang, is articulated to the under side of the basal segment and moves in a vertical plane, so as to constitute with the upper jaw a pair of powerful nippers. On the inner side of the basal segment there is frequently a series of hard ridges which, by being rubbed against the corresponding ridges of the other jaw, give rise to a harsh grating sound. These are the *stridulating-ridges.* Projecting forwards from the lower half of the fore part of the head between the mandibles there is a horny, hair-tipped *rostrum*, which bears the mouth at its extremity. The sternal elements of the cephalothorax are practically absent, their place being taken by the basal segments or *coxæ* of the appendages, which meet each other in the median ventral line and are immovably welded together. The *palpi* are long, pediform, and consist of six segments, named *coxa*, *trochanter*, *femur*, *patella*, *tibia*, and *tarsus.* The coxa is furnished with a maxillary process; the trochanter is very short; the tarsus, also short, is sometimes freely movable, but is generally

A.

B.

C.

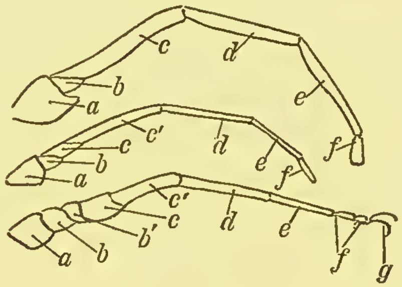


Fig. 46.—A, Palpus; B, 1st leg; and C, 3rd leg of *Galeodes.* *a*, coxa; *b*, trochanter; *b′*, trochantella; *c*, femur of palp and trochantin of 1st and 3rd leg; *c′*, distal end of femur of 1st and 3rd leg; *d*, patella; *e*, tibia; *f*, tarsus; *g*, claws.

united to the tibia, with a mere sutural line between the two. The 1st leg much resembles the palpus, to which it is fused at the base, but is shorter and weaker and has an additional small segment, the *trochantin*, cut off from the base of the femur; the tarsus may or may not be furnished with a claw. The 2nd, 3rd, and 4th legs are the organs of progression. They differ structurally from those of the 1st pair in having the trochanters divided into two distinct segments, so that between the coxa and the femur three segments are intercalated, namely the *trochanter*, the *trochantella*, and *trochantin.* This multiplication of basal segments confers exceptional flexibility upon the legs, and more than compensates for the rigidity of the coxæ. The patella and tibia are unsegmented; the tarsi are segmented or not, and to the apex is articulated a pair of long claws, which differ from those of all other Arachnids in being pediculated or borne upon long stalks. Attached to the

base of the 4th leg there are five sensory organs, the *malleoli*—two on the coxa, two on the trochanter, and one on the trochantella. Each consists of a slender basal piece or *stalk*, and an expanded distal piece, the *blade*. There is no distinct waist between the cephalothorax and abdomen such as exists in the *Uropygi* and *Amblypygi*. The *abdomen* consists of ten segments, each of which, with exception of the last, bears a tergal plate above and a sternal plate below; the last or anal segment is represented by a single plate marked with a vertical slit, the *anal aperture*.

Generative organs open upon or behind the sternum of the 1st abdominal segment, the plate showing modifications in structure according to sex and age.

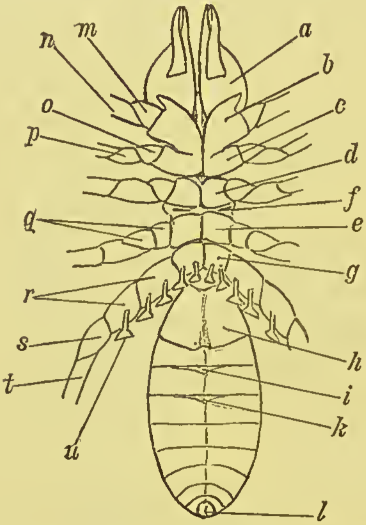


Fig. 47.—Lower side of trunk and of bases of appendages of *Galeodes*. *a*, mandibles; *b*, *e*, *d*, *e*, *g*, coxæ of palp and of 1st, 2nd, 3rd, and 4th legs; *f*, thoracic stigma; *h*, 1st abdominal sternum; *i*, *k*, abdominal stigmata; *l*, anal segment; *m*, trochanter, and *n*, base of femur of palp; *o*, trochanter; *p*, trochantin of 1st leg; *q*, trochanter and trochantella of 3rd leg; *r*, trochanter and trochantella, *s*, trochantin, and *t*, base of femur of 4th leg; *u*, external malleolus.

The *respiratory organs* are in the form of tubular tracheæ, the stigmata of which open upon or behind the sterna of the 2nd and 3rd, rarely also of the 4th, abdominal segment. There is, moreover, a pair of large stigmata situated upon the ventral side of the 4th segment of the cephalothorax, one on each side behind the coxa of the appendage.

Sexual characters. Male with mandibles less strongly toothed and (except in one American genus) furnished above at the base of the upper jaw with an organ of unknown function, the *flagellum*. The *first abdominal sternum* in the adult female consists of a single plate marked with a median longitudinal groove. In the adult

males and tho young females, on the contrary, the right and left halves of this plate remain distinct, and protruding between them, in the middle line, there is a pair of lip-like valves covering the generative aperture.

Habits. These Arachnida are remarkable for their amazing agility. Though principally desert forms, they are also met with in forests, at least in India. They are nocturnal and strictly carnivorous. Some of the species at all events dig holes in the ground, and the females at the breeding-season live in burrows for the protection of themselves and their young. The latter are born in the egg-stage.

Distribution. Spain, Greece, and S. Russia in Europe; over the whole of Africa and South-western Asia from Turkestan to Arabia and Baluchistan, thence throughout India and into Ceylon; also in Siam and (?) the Moluccas; America from the Southern States of the Union to the Andean chain in Chili and the Argentine Republic.

The families and subfamilies represented in the fauna of British India may be diagnosed as follows:—

a. Tarsus of palp narrow at base and freely articulated to tibia; stalk of claws hairy	**Galeodidæ.**
b. Tarsus of palp broad at base and immovably fused to tibia; stalk of claws not hairy	**Solpugidæ.**
a^1. Anal segment small, the aperture extending almost up to its superior edge	DÆSIINÆ.
b^1. Anal segment large, the aperture scarcely surpassing its middle	RHAGODINÆ.

Family GALEODIDÆ.

Stigmata upon the 2nd and 3rd abdominal segments opening beneath the posterior edge of the sterna and protected by a pair of transversely elongated finely toothed plates, the *serrulæ.*

Tarsus of palp narrowed at the base and movably articulated to the tibia.

Claws of legs, in the adult, with several rows of hairs upon the stalk.

Anal segment small, the aperture extending almost to its upper edge.

Distribution. Africa north of the Sahara and southwards into Somaliland; South-eastern Europe, Greece and South Russia; South-western Asia, Turkestan, Asia Minor, Arabia, Persia, Afghanistan and Baluchistan, thence over the whole of Western and Southern India. Absent from Ceylon and Burma.

Genus **GALEODES**, Oliv.

Galeodes, *Olivier, Encycl. Méthod.* vi, p. 579, 1791 (in part); *C. Koch, Arch. Nat.* 1842, pt. i, p. 350; *Simon, Ann. Soc. Ent. Fr.* 1879, p. 96; *Karsch, Arch. Nat.* 1880, p. 229; *Pocock, A. M. N. H.* (6) xx, p. 251, 1897; *Kraepelin, Jb. Hamb. wiss. Anst.* xvi, p. 201, 1899.

Rhax, *Hermann, Mém. Ins. Apt.* pp. 13 & 15, 1804 (nec *Rhax* of C. Koch and subsequent authors).

Zerbina, *Karsch, Arch. Nat.* 1880, p. 233.

Zombis, *Simon, Ann. Mus. Genova*, xviii, p. 253, 1883.

Ocular tubercle furnished in front with a pair of symmetrically disposed bristles, one on each side of the middle line. *Mandible* with very weak stridulating-ridges. *Flagellum* of male erectile; consisting of a slender subcylindrical basal portion or stem and of a gradually expanded but apically pointed distal portion or blade, the edges of which are incurved to form a narrow hair-lined hollow. Tarsus of 1st *leg* armed with two small claws concealed amongst the hairs; tarsi of 2nd and 3rd legs spined beneath, consisting of two segments, of 4th of three segments; tibia of 2nd and 3rd legs strongly spined above.

Male with head narrower than in female; mandibles weak, studded above with long erect spines for the protection of the flagellum; distal teeth of upper jaw weak or almost obsolete. Palpi longer and stronger. *Legs* longer; tarsus of 4th clothed below with a pad of variously modified bristles. A row of reddish bristles upon the posterior border of the 5th abdominal sternum.

Type, *G. araneoides*, Pallas. S. Russia and Transcaspia.

Distribution. As above under family.

Synopsis of Indian Species.

Males.

a. Pad on 4th tarsus consisting of a few stout bacilliform bristles .... *G. bacillifer*, p. 144.

b. Pad on 4th tarsus consisting of many not clavate bristles.

- a^1. Lower side of tibia of palp without cylindrical bristles and with only a few small setiferous tubercles .... *G. nigripalpis*, p. 144.
- . Tibia of palp studded below with setiferous tubercles bearing stiff cylindrical or fusiform bristles.
  - a^2. Cylindrical bristles on tibia of palp very slender, sparsely set, rising from small tubercles which scarcely extend to the apex of the segment.... *G. indicus*, p. 142.
  - b^2. Bristles on lower side of tibia of palp thick, numerous, rising from large tubercles which extend to the apex of the segment.

a^3. Proximal tarsal segment of 2nd and 3rd legs with a posterior basal spine, 3 minor teeth on lower jaw of mandible .... *G. afghanus*, p. 140.

b^3. Proximal tarsal segment of 2nd and 3rd legs without posterior basal spine; 2 minor teeth on lower jaw.

a^4. Tibia and tarsus of palp entirely pale yellow; bristles on lower side of tibia fusiform .... *G. macmahoni*, p. 141.

b^4. Tibia of palp fuscous, as dark as patella or darker; bristles on its lower side subcylindrical.

a^5. Large (over 40 mm.); yellow; patella of palp twice width of head .... *G. agilis*, p. 140.

b^5. Smaller (about 30 mm.); browner; patella of palp less than twice width of head .... *G. orientalis*, p. 138.

Females.

a. Tarsus of legs scantily clothed below with stout hairs; 9 pairs of strong short spines on tibia of palp .... *G. afghanus*, p. 140.

b. Tarsi thickly clothed below with thin hairs; tibia of palp without 9 pairs of short spines.

a^1. Tibia of palp armed beneath with 6–7 pairs of short spines, none of which exceed the height of the segment.

a^2. Lower jaw of mandible with 3 minor teeth .... *G. sabulosus*, p. 139.

b^2. Lower jaw of mandible with 2 minor teeth.

a^3. Larger; legs and palpi flavous .... *G. fatalis*, p. 137.

b^3. Smaller; legs and palpi partially infuscate .... *G. orientalis*, p. 138.

b^1. Tibia of palp armed with long and slender spines, some or most of which exceed the height of the segment.

a^4. Patella of palp fuscous, tibia entirely pale; 2 minor teeth on lower jaw .. *G. macmahoni*, p. 141.

b^4. Patella and tibia of palp approximately of the same colour; 3 minor teeth on lower jaw.

b^5. A posterior basal spine on tarsus of 2nd and 3rd legs .... *G. bacillifer*, p. 144.

b^5. No posterior basal spine on tarsus of 2nd and 3rd legs .... *G. indicus*, p. 142.

111. **Galeodes fatalis**, *Lichtenstein & Herbst*, *Nat. ungefl. Ins.* pt. i, p. 32, t. i, fig. 1, 1797 (♀) (Solpuga); *Pocock*, *Jour. Bom. N. H. Soc.* ix, p. 441, 1895 (in part ♀): Galeodes vorax, *Hutton*, *J. A. S. B.* xi, pt. 2, p. 857, 1842: Galeodes bengalensis, *Butler*, *Tr. Ent. Soc.* 1873, p. 419.

Colour mostly pale yellow, head with black tubercle, and lightly infuscate at the sides; dorsal plates of abdomen lightly infuscate. *Head* wide, in adult wider than length of tibia, nearly or quite equal to patella of palp; exceeding tibia and nearly or quite equal to patella of 4th leg. *Mandible* with the 3rd and 5th teeth of the upper jaw large, there being normally only *one* minor tooth behind the third; lower fang with two minor teeth. *Palpi* short; patella armed externally beneath with from 3 to 4 short spines, which are shorter than the diameter of the segment, and internally with corresponding longer and thinner spines; stout bristles arranged at regular intervals and symmetrically on the two sides; tibia armed below with six pairs of short stout spines, the apical the longest, the basal the shortest, all of them shorter than the diameter of the segment. *Legs* with tarsi of 2nd and 3rd armed with 7 spines, there being no posterior basal spine; *tarsus* of 4th with 5 pairs of spines. *Malleoli* small; blade of external a little exceeding width of ocular tubercle.

Measurements in mm.—Total length 46, width of head 13·5, of palp 41·5, 1st leg 29, 4th leg 54.

Distribution. Central and North India (*Hutton*); Bengal; Gwalior (*Maries*); Karaghora in Kathiawar (*Bulkley*).

112. **Galeodes orientalis**, *Stoliczka, J. A. S. B.* xxxviii, p. 209, t. xviii, figs. 4–5, 1869; *Pocock, Jour. Bom. N. H. Soc.* ix, p. 444, 1895 (*nec* G. orientalis, *Simon, Bull. Soc. Zool. Fr.* x, pp. 1–2, 1885).

♀. Structurally resembling *G. fatalis*, but smaller and darker, the ground-tint being reddish yellow, not sandy yellow; mandibles ornamented with thin palely fuscous lines; patella of palp infuscate,

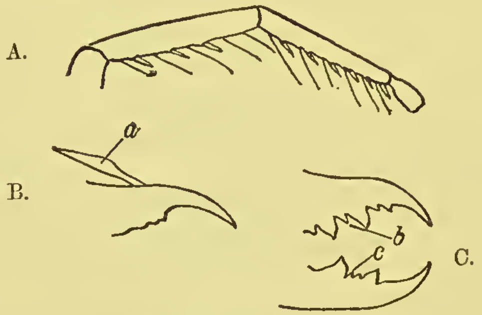


Fig. 48.—*Galeodes orientalis.*

A. Extremity of palpus.
B. Upper jaw and flagellum (*a*) of ♂.
C. Upper and lower jaw of ♀: *b*, minor tooth of upper jaw; *c*, minor teeth of lower jaw.

pale at the extremities; tibia more strongly infuscate than patella, the base pale; tarsus paler than tibia; tibia and tarsi of legs clear

yellow; the femur and patella of the 4th pair, and to a lesser extent of the 3rd, infuscate.

♂. Resembling the female in colour, size, and spine-armature of legs, but with longer, stronger legs and palpi, and narrower head and mandibles. Width of *head* equal to about half the length of the patella of the palp and nearly three-quarters its tibia, a little less than two-thirds the length of the patella and about three-quarters the tibia of the 4th leg. *Mandible* with *flagellum* short, the stalk not much shorter than the blade; the blade lanceolate, much broader than the stalk, broadest across the basal half and evenly narrowed to the point; distal five teeth of the upper jaw small and forming a lobulate crest; lower jaw with two minor teeth. *Palp* with patella armed below with about twelve spines arranged in three rows, the spines exceeding the height of the segment; tibia armed with six pairs of spines, these spines much longer than in the female, but not exceeding the height of the segment; inferior area of segment between the spines studded from base to distal end with setiferous tubercles, the setæ they bear are short, erect, cylindrical, slightly narrower at the base, truncate at apex and not so long as the spines. Pad on tarsus of 4th *leg* consisting of whitish but opaque, basally narrowed and apically acuminate but not filiform bristles. A transverse row of about half a dozen reddish-coloured bristles on the posterior border of the 5th abdominal *sternum*. Large blade of the external *malleolus* at least as wide as half the width of the head-plate.

Measurements in mm.—

	Total length.	Width of head.	Length of palpus.	Length of 1st leg.	Length of 4th leg.	Length of patella of palp.
♀....	30	8	28	20	39	
♂....	27	7·5	41	29	51	13·5

Loc. Northern India; Birbhum and Delhi (*Stoliczka*); Mussoorie (*Rothney*); Gwalior (*Maries*); Gya (*Phipson*); and Karaghora in Kathiawar (*Bulkley*).

Subspecies **rufulus**, nov.

♀. Closely allied to the typical form, but with the *palpi* darker; the whole of the patella, tibia, and tarsus being uniformly infuscate, distal extremity of femur of palp, and femur and patella of legs, infuscate. *Tarsus* of 4th leg with normally only 4 pairs of spines, the apical segment rarely armed with 1 spine. Total length up to about 30 mm.

Loc. E. Khandesh (*Madan*); Pimpalner in E. Khandesh and Shirpur in W. Khandesh (*Pearson*); Eastern Poona (*Wroughton*).

113. **Galeodes sabulosus**, sp. n.

Allied to both the preceding in structure, and approaching *G. orientalis* in size and *G. fatalis* in colour, though the tibia of the palp is infuscate in the basal half; differing from both

in having three distinct minor teeth on the lower jaw of the mandible.

Measurements in mm.—Total length 32, width of head 7, length of palp 27, of 1st leg 19, of 4th leg 37.

Distribution. Kohat in the Punjab (*Batten*).

114. **Galeodes agilis**, *Pocock, Jour. Bom. N. H. Soc.* ix, p. 445, t. A, figs. 1–1 *c*.

♂. Nearly allied to *G. orientalis*, but much larger. Prevailing colour paler yellow than in *G. orientalis*; head infuscate anteriorly, mandibles pale above; patella of palp deeply or slightly infuscate; tibia and tarsus deeply and uniformly infuscate, sometimes almost black; legs pale or with femur and patella of 4th infuscate. *Palpi* with patella twice as long as width of head, tibia longer than width of head by one-third of its length.

Measurements in mm.—Total length 44, width of head 11, length of palpus 65, of 1st leg 47, of 4th leg 76, tibia of palp 22.

Loc. North-western India: Bikanir in Rajputana (*Talbot*); Jacobabad (*Bombay N. H. Soc.*); Khost in Baluchistan (*Smith*).

115. **Galeodes afghanus**, *Pocock, A. M. N. H.* (6) xvi, p. 82, 1895.

♀. *Colour*: head fuscous; mandibles yellow, obscurely banded; palpus with distal half of femur and greater part of patella fuscous with pale extremities, tibia and tarsus entirely flavous; legs yellow, with femora of 3rd and 4th and to a less extent the patellæ infuscate in the middle. Abdominal terga greyish black, sides of abdomen covered with silky greyish-yellow hairs.

Width of *head* about two-thirds the length of the patella and as long as the tibia of the palp and of 4th leg. *Mandibles* with upper jaw armed with two large and widely separated minor teeth behind the 3rd tooth; lower jaw armed with three minor teeth. Patella of *palp* armed beneath externally with about 4 shorter spines and internally with longer spines; *tibia* armed below with 9 pairs of longer and shorter strong spines, the longest of which only exceed the height of the segment at its narrowest part. *Legs* longer than in *G. fatalis*, but with the same spine-armature, except that there is a posterior basal spine on tarsus of 2nd and 3rd legs; tarsi much more scantily clothed beneath than in *G. fatalis*, the hairs being much fewer, short, and subspiniform. *Malleoli* long; blade of external malleolus about twice the width of the ocular tubercle.

♂. Resembling the female in colour. *Mandibles* and flagellum practically as in *G. macmahoni*, but with three minor teeth on the lower jaw. *Palpi* shorter than in *G. macmahoni*; the patella barely twice the width of the head-plate, which is distinctly less than half the length of tibia and tarsus taken together. Spine-armature of tarsi of 2nd and 3rd legs as in ♀. Blade of external *malleolus* less than half the width of the head-plate.

Measurements in mm. :—

	Total length.	Width of head.	Length of palpus.	Length of 1st leg.	Length of 4th leg.	Length of patella of palp.	Length of tibia and tarsus.
♀ ..	46	14	58	42	71	19	18
♂ ..	34	9	54·6	41	?	18·5	16·5

Loc. Between Quetta and Kandahar (*Godwin-Austin*); Omára on the Mekran coast, 130 miles W. of Karáchi (*Townsend*).

116. **Galeodes macmahoni**, sp. n.

♀. Closely resembling the female of *G. afghanus* in colour, but much yellower, the head only lightly infuscate in front; mandibles scarcely visibly banded above; femur of palp uniformly yellow; legs also uniformly yellow, only the femur of the 4th lightly infuscate distally. *Mandibles* with only two minor teeth on lower jaw as in *G. fatalis*, but with two behind the 3rd tooth of the upper jaw as in *G. afghanus*; the posterior of the two, however, is much smaller than in that species and tuberculiform. *Palpi* longer than in *G. afghanus*; the width of the head about two-thirds the length of the tibia, and much less than two-thirds that of the patella; spines on patella of palp all long and slender, considerably exceeding the height of the segment and only a little thicker at the base than the bristles; the six pairs of spines on the tibia much thinner than in *G. fatalis* and *G. afghanus* and a little longer than in the latter, the bristles that project between them long and slender at the base, much as in *G. fatalis*. Spine-armature of tarsi and hairy clothing on under side of these segments as in *G. fatalis*. External *malleolus* with blade a little exceeding the ocular tubercle.

♂. Resembling the female in colour, and like the males of *G. agilis* and *orientalis* in spine-armature of legs and palpi and dentition of mandible. At once recognizable from the latter by the colour of the palpi. *Flagellum* with the blade narrower and longer in proportion to its width than in *G. agilis*. *Legs* and *palpi* longer than in the latter, the patella of the palp being a little more than twice the width of the head-plate, and the tibia and tarsus taken together are also a little more, whereas in *G. orientalis* and *G. agilis* the width of the head is always more than half the length of these segments. Again, the patella of the 4th leg is twice and the tibia nearly twice the width of the head. Spines on under side of tibia of palp less cylindrical than in *G. agilis* and *G. orientalis*, mesially incrassate, then narrowed basally and apically. Spines composing pad on 4th tarsus shorter, thicker, and more abruptly acuminate than in *G. orientalis* and *G. agilis*. Blade of external *malleolus* as large as in *G. agilis*.

Measurements in mm. :—

	Total length.	Width of head.	Length of palpus.	Length of 1st leg.	Length of 4th leg.	Length of patella of palp.	Length of tibia and tarsus.
♂ ..	38	11	52	37	65	17	16
♀ ..	33	85	60	?	71	19·5	17

Loc. Northern Baluchistan (*Maynard & MacMahon*).

117. **Galeodes indicus**, sp. n.

[= *Galeodes fatalis*, Pocock, Jour. Bom. N. H. Soc. ix, p. 441, pl. A, fig. 2. & pl. B, fig. 1 *a*, in part (♂), 1895; not *fatalis*, Herbst: *G. orientalis*, Simon, Bull. Soc. Zool. Fr. x, p. 1, 1885; not *orientalis*, Stol.]

♀. *Colour*: head infuscate, paler in the middle line; mandibles yellower than the head and marked with fuscous lines; upper side of abdomen infuscate, the dorsal plates darker; legs and palpi a tolerably uniform yellowish brown, patella and basal half of tibia of palp and femur and patella of 4th leg at most lightly infuscate. *Head* about two-thirds the length of the patella of the palp and of 4th leg, shorter than the tibia of palp by about one-fifth of its length, and not quite so long as tibia of 4th leg. Dentition of *mandible* as in *G. afghanus*. Patella of *palp* armed below with about eight pairs of long setiform spines, of subequal thickness and alternating in length, but considerably exceeding the height of the segment; tibia similarly armed below with about ten or eleven pairs of longer and shorter spines, half of them on each side being very long and setiform, and slightly stouter than the others, which are short but for the most part exceed the height of the segment. Tarsi of legs armed as in *G. fatalis*, except that the distal tarsal segment of the 4th is spined. Blade of external *malleolus* slightly exceeding the ocular tubercle.

A.

B. C

Fig. 49.—*Galeodes indicus*. A. Extremity of palpus of ♀. B. Upper jaw of ♂ with, *d*, flagellum. C. Upper and lower jaws of ♀: *e*, minor teeth of upper jaw; *f*, ditto of lower jaw.

♂. Like the female in colour, spine-armature of tarsi, dentition of lower mandibular fang, &c. *Flagellum* long, not quite straight; blade much longer than the handle. *Palpi* very long, as in *G. macmahoni*, the patella more than twice the width of the head, which is also less than half the length of patella and tarsus taken together; head scarcely half the length of the patella of the 4th leg and not

quite two-thirds its tibia; tibia of palp differing from that of the previously described species in that the cylindrical setæ on the underside are very slender, few in number, and rarely extend to the distal end of the segment; the tubercles that bear them, moreover, are much smaller than in other species. *Tarsus* of 4th leg covered below with a pad of black or brown setæ, which, however, do not spread on to the apical segment. Blade of external *malleolus* less than half the width of the head. 5th abdominal *sternum* with marginal row of reddish bristles.

Measurements in mm.:—

	Total length.	Width of head.	Length of palp.	Length of 1st leg.	Length of 4th leg.	Length of patella of palp.	Length of tibia and tarsus of palp.
♀ ..	30	7·5	38	24	48	12	12
♂ ..	28	7	54	37	62	18·5	16·5

Loc. Ranging over the whole of India from Bengal in the north to Cape Comorin in the south.

Three subspecies of this species seem to be recognizable:—

a. The typical form (= *G. fatalis*, Pocock, Jour. Bom. N. H. Soc. p. 441, 1895, ♂), as described above, is the Northern form, with legs and palpi paler and almost uniformly yellowish brown or at most only slightly infuscate.

Loc. Gwalior (*Maries*) and Gya (*Phipson*); Bilaspur in the Central Provinces (type); Thana, north of Bombay.

It is this northern form, then known only from a young female and an adult male from Gwalior, that I originally referred to *G. fatalis*, in conjunction with an adult ♀ of the genuine *fatalis* from the same locality. The male of the latter is still unknown; but seeing how closely the female resembles that of *G. orientalis*, there can be no doubt that the male will prove to be like the male of that species, and not like the male of *G. indicus*.

b. Subspecies **obscurior**, nov.

Resembling the typical form in spine-armature of tarsi and other structural points, but much darker in colour; palpi infuscate, with the tarsus, base of femur, and a narrow area adjacent to the joints of tibia and patella pale; in the 4th leg the femur, patella, and at all events the base of the tibia infuscate; the 2nd and 3rd legs also infuscate, but less so than the 4th; even the upper side of the trochanters are clouded with fuscous. Length up to 41 mm., width of head 11·5, length of palp 45.

Loc. East Khandesh, Pimpalner &c. (*Pearson, Madan*); Násik (*Millett*).

c. Subspecies **australis**, nov. (= *orientalis*, Simon).

Southern form, with legs and palpi more infuscate than in the typical *G. indicus*, but certainly less so than in *G. indicus* subsp. *obscurior*. Further differing from both the northern forms in the spine-armature of the tarsi of the 2nd and 3rd legs, which are armed posteriorly with only 1 or 2 spines. Male with pad on the 4th tarsus

composed of hairs which are paler in colour, more numerous, longer and sharper apically than in the male of the typical *G. indicus*.

Loc. Madras (*Jerdon*); Secunderabad (*Ricardo*, type); Tinnevelly (*Barber*), and Kanara (*Bell*).

118. **Galeodes nigripalpis**, sp. n.

♂. Colour as in *G. agilis*, but with legs darker, the distal end of the femur, the patella, and tibia being infuscate; 1st leg with patella, tibia, and tarsus infuscate. Flagellum of *mandible* shorter than in the other species, its inferior (posterior) edge straight from base to tip, upper edge of blade evenly convex, rather abruptly narrowed to a point, the widest portion of the blade being about in the middle; one minor tooth on lower jaw. *Palpi* armed with spines as in *G. agilis* and other species, but the under surface of the tibia not thickly studded with tubercles bearing stiff short bristles, but nearly smooth with only a few tubercles bearing long setæ and covered with short slender silky hairs; palpi a little longer than in *G. agilis*; patella more than twice the width of the head, which is half the length of the tibia and tarsus taken together. *Tarsi* of 2nd and 3rd legs armed with the normal 4 anterior spines, but with only 2 posterior spines on tarsus of 2nd, 1 on the apical segment, the others on the distal end of the basal segment; tarsus of 4th with apical segment unspined. Length of patella of 4th leg twice the width of head; tibia longer than the width of the head by one-fourth of its length. *Malleoli* large; blade of the external malleolus exceeding half the width of the head.

Measurements in mm.—Total length 29, width of head 7·5, length of palp 52, length of 1st leg 38, length of 4th leg 62, patella of palp 17, tibia of palp 15·5.

Loc. Omára on the Mekran coast, Baluchistan (*Townsend*).

119. **Galeodes bacillifer**, sp. n.

♀. Allied to *G. indicus*, but a uniform pale yellow, the ocular tubercle alone being black. Width of *head* a little more than half the length of the patella of the palp. *Mandibles* with two bluntly rounded minor teeth on the lower jaw, the posterior of them separated by a widish space from the posterior major tooth, and two behind the third tooth on the upper jaw. *Palpi* armed as in *G. indicus*, the spines on the patella all long and setiform; also on the tibia long setiform spines alternate with shorter thinner spines. *Legs* spined as in *G. indicus*, but the first tarsal segment of 2nd and 3rd legs armed with a posterior basal spine; tarsus of 4th armed with 4 pairs of spines; the apical segment unspined.

♂. Like the female in colour, and allied to the male of *G. indicus*. *Mandibles* with flagellum and tooth-armature as in that species. *Palpi* very long, patella two and a half times as long as the width of the head, tibia and tarsus a little more than twice as long; patella of 4th leg also about two and a half times as long, tibia nearly twice as long; tibia of palp scantily clothed beneath with long, slender, cylindrical bristles as in *G. indicus*. *Tarsi* of 2nd

and 3rd legs with posterior basal spine; tarsus of 4th clothed beneath with short distally expanded clavate bristles *. Width of blade of external malleolus equal to half the width of the head.

Measurements in mm.:—

	Total length.	Width of head.	Length of palpus.	Length of 4th leg.	Length of patella of palp.	Length of tibia and tarsus of palp.
♀.	30	6	33	44	11	11
♂.	22	6	46	59	15	14

Loc. Northern Baluchistan (*Maynard & MacMahon*).

Family SOLPUGIDÆ.

Apertures of the abdominal respiratory organs not protected by a pair of *serrulæ*. *Tarsus* of palp not narrowed at its base, immovably united to tibia, from which it is separated by a sutural line. Basal portion of *claws* smooth, hairless. *Anal segment* large or small.

Distribution. As stated above under Order Solifugæ.

Subfamily DÆSIINÆ.

Kraepelin, Jb. Hamb. wiss. Anst. xvi, p. 221, 1899.

Anal segment small, roundish, almost completely divided into a right and left half by the anal aperture, which extends nearly to its upper edge. Anterior border of *head* not transverse, lightly produced. *Mandible* with stridulating-ridges highly developed. *Flagellum* membranous, with incurved edge or edges, longish, subovate, rounded at one extremity, pointed at the other, movably articulated to the inner side of the upper jaw by a single point of attachment somewhat resembling a pin-head. *Tarsus* of 1st leg without claw, of remaining legs spined beneath. *Tibiæ* of 2nd and 3rd legs spined above.

Distribution. Mediterranean, Ethiopian, and Western Oriental Regions; America from Texas to the Argentine Republic.

One Indian genus.

* Apical tarsal segment considerably longer than the second, spine-armature also very abnormal; the basal segment armed with 5 spines behind and 10 spines in front, 4 being situated close together, 2 above and 2 below at the base, and 6 in a row; second segment with a pair of spines, apical segment with a single posterior spine. The 4th leg is present only on one side of the body, so it is not possible to judge of the constancy of this peculiar spine-armature nor of the value of the unusual inequality in length between the second and third tarsal segments.

Genus GLUVIOPSIS, Kraepelin.

Gluviopsis, *Kraepelin, Jb. Hamb. wiss. Anst.* xvi, p. 235, 1899.

♀. Anterior border of *head* lightly convex. *Ocular tubercle* furnished with numerous short stout bristles; similar bristles scattered over the head, being longest near the margins, and also on the thoracic and at least on the anterior abdominal terga. Upper jaw of *mandible* with 1st, 2nd, and 4th teeth large, 3rd small; lower jaw with 1 minor tooth. Patella and tibia of *palpus* armed below with two rows of spines and studded with short, erect, cylindrical bristles above and below; only a few tactile hairs on the palpus. *Legs* with tarsi one-jointed, tarsus of the 4th about five times as long as high; femur of 4th about five times as long as high; tibia of 2nd and 3rd with 5 posterior and dorsal spines.

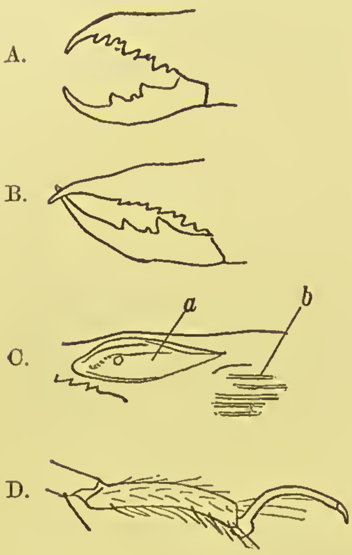


Fig. 50.—*Gluviopsis atratus.* A. Jaws of ♀. B. Jaws of ♂. C. Upper jaw of ♂ from inner side, showing flagellum (*a*) and some of the stridulating-ridges (*b*). D. Tarsus of 4th leg.

♂. With dorsal surface of *head*, *thorax*, and *abdomen* much more strongly spined than in female; upper *jaw* weakly toothed; *flagellum* membranous, fusiform, rounded in front and pointed behind when lying at rest, its upper edge folded over, its anterior extremity not projecting so far as the 1st mandibular tooth, hinged to the jaw by a swivel joint, which is visible as a rounded chitinous button.

Type, *G. rufescens*, Pocock; N. Africa and Arabia.

Distribution. Countries south and east of the Mediterranean (Algiers, Asia Minor), Arabia, Somaliland, Socotra, and Western India.

120. Gluviopsis atratus, *Pocock, A. M. N. H.* (7) v, p. 303, 1900.

♀. *Colour* blackish, body covered with yellowish bristles and spines; 1st and 2nd legs mostly pale, base of palp and base and apex of 3rd and 4th legs pale. Width of *head* about equal to length of patella or to tibia and tarsus of palp, shorter than patella and longer than tibia of 4th leg. *Palpus* about three times as long as width of head.

♂. Much more coarsely and closely spined than female; terminal fangs of *mandible* long and slender, the upper nearly straight,

bent slightly downwards. *Palpi* longer, patella as long as tibia and tarsus and about one and a half times as long as width of head; patella of 4th leg nearly twice as long as, and tibia about one-fifth longer than, width of head. Modified hairs of 2nd abdominal *sternum* long, slender, incrassate, with apex acuminate.

Measurements in mm. :—

	Total length.	Width of head.	Length of palpus.	Length of 4th leg.
♀	14	3·5	11·5	17·8
♂	13	3	13	20

Loc. Western India: Poona Ghats (*Irani*); Pimpalner in Western Khandesh (*Pearson*).

Subfamily RHAGODINÆ.

Pocock, A. M. N. H. (6) xx, p. 250, 1897; *Kraepelin, Jb. Hamb. wiss. Anst.* xvi, p. 207.

Anal segment very large, the anal aperture situated in its lower half and scarcely extending to its centre. Anterior border of *head* straight and transverse. *Mandibles* with stridulating-ridges scarcely developed. *Flagellum* horny. *Legs* with tarsi spined beneath, and tibiæ of 2nd and 3rd legs strongly spined above.

Distribution. North Africa from Senegambia to Masailand; Syria, Arabia, Persia; India and Ceylon; Siam, Moluccas.

Genus RHAGODES, Pocock.

Rhax, *C. Koch, Arch. Nat.* 1842, p. 354, and of subsequent authors up to 1897 (*nec* Rhax, *Hermann*).

Rhagodes, *Pocock, A. M. N. H.* (6) xx. p. 252, 1897; *Kraepelin, Jb. Hamb. wiss. Anst.* xvi, p. 209, 1899.

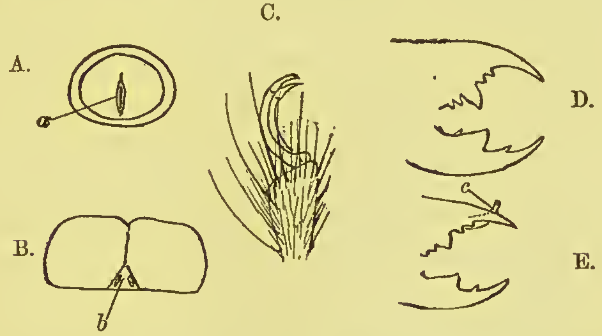


Fig. 51.—*Rhagodes brevipes.* A. Anal segment, showing anal aperture (*a*). B. Second abdominal sternum with stigmata (*b*). C. Tarsus of 4th leg. D. Jaws of female. E. Jaws of male with flagellum (*c*).

Ocular tubercle with a pair of setæ. *Mandibles* large, the 3rd

tooth of the upper jaw very large; lower jaw armed with one large tooth and two small teeth. *Flagellum* consisting of two closely applied pieces forming an apparently single organ fixed to the inner side of the base of the upper jaw, the basal half broad and directed forwards, the apex narrow and upturned, projecting vertically above the edge of the jaw. *Legs* short, tarsus of 1st tipped with claws; each tarsus consisting of a single segment. Male smaller than female and with legs longer; teeth of mandible smaller, 3rd tooth of upper jaw not projecting so strongly.

Type, *R. melanus*, Oliv.

Distribution. As above under *Rhagodinæ*, but not occurring in Siam and the Moluccas.

Synopsis of Indian Species.

a. Legs and palpi ornamented with black rings and spots.
- *a*¹. Antero-lateral angles of head yellow; femur of palp black beneath; a black spot on the lower surface of the femur and patella of 1st leg and on posterior surface of patella of 4th leg .... *R. nigrocinctus*, p. 151.
- *b*¹. Antero-lateral angles of head not yellow; lower side of femur of palp, of legs of first pair, and tibia of 4th pair uniformly yellow (according to Simon) .... *R. annulatus*, p. 152.

b. Legs and palpi uniformly yellowish or reddish brown, with the tibia and tarsus of palpus and of 1st leg either partially or entirely deep brown.
- *a*². Mandibles yellow, head black.......... *R. nigriceps*, p. 150.
- *b*². Mandibles and head of the same colour, black or deep brown.
  - *a*³. Abdomen entirely black above and at the sides; tibia of 4th leg furnished in front beneath with only one spine on the proximal side of the inferior apical spine .... *R. brevipes*, p. 149.
  - *b*³. Abdomen not entirely black; tibia of 4th leg with 2 spines on the proximal side of the inferior apical spine in front.
    - *a*⁴. Upper side of abdomen black in its anterior, yellow in its posterior half, the last somite quite black .. *R. semiflavus*, p. 149.
    - *b*⁴. Upper side of abdomen mesially flavous; anal somite uniformly flavous.
      - *a*⁵. Sides of abdomen ornamented with a broad black band; only 1 stout spine at distal end of patella of 2nd and 3rd legs................ *R. vittatus*, p. 150.
      - *b*⁵. No black band on sides of abdomen; at least 2 spines on apex of patella of 2nd and 3rd legs .. *R. phipsoni*, p. 152.

121. **Rhagodes semiflavus**, *Pocock, A. M. N. H.* (6) iv. p. 473, 1889; *id. Jour. Bom. N. H. Soc.* ix, p. 450, t. B, fig. 2 (Rhax).

Colour. Head and mandibles a uniform deep brown; thoracic terga pale: anterior four terga of abdomen and anterior portion of the 5th blackish, posterior portion of 5th and the whole of the 6th, 7th, 8th, and 9th pale yellow, the last or anal segment black; sides of abdomen yellowish brown in front opposite the black terga, a deeper more chocolate brown behind opposite the pale terga; ventral surface of abdomen yellowish, covered with reddish-golden hairs; palpi flavous, with tibia and tarsus deep brown; first leg flavous, with tarsus and distal end of tibia deep brown and tibia clothed with reddish hairs; remaining legs uniformly flavous, with deep brown spines; malleoli uniformly flavous. Width of *head* about equal to patella and half the tibia of the palp, to tibia and two-thirds of the patella of the 4th leg, and to patella, tibia, and half the tarsus of the 3rd leg. *Palp* scarcely exceeding twice the width of the head. 2nd *leg* with patella armed above with one stout median apical spine, and below with one pair of setiform spines at the distal end and some stout setæ behind them; tibia armed with 6–7 stout spines above in an irregular row, also with a pair of spines below at the distal end and two spiniform setæ in a row on the underside in front, the distal of these much the stouter of the two; tarsus armed with three pairs of spines in addition to numerous stiff bristles: 3rd leg armed like the 2nd, the inferior pair of setiform spines on patella stouter, the proximal of the two spiniform setæ on the front of the underside of tibia thinner as compared with the distal; patella of 4th with a pair of distal spiniform setæ, the anterior the stouter and shorter of the two; tibia not spined above, but armed with a pair below at the distal end, one in front at the distal end and two on the under surface in front.

Measurements in mm.—♀. Total length 33, width of head 9, length of palp 21, of 4th leg 27, patella, tibia, and tarsus of palp 14.

Loc. Kohat in the Punjab (*Batten*).

122. **Rhagodes brevipes**, *Gervais, L'Institut*, x, 1842, p. 76; *id. Ins. Apt.* iii, p. 87, 1844 (Solpuga); *Pocock, Jour. Bom. N. H. Soc.* ix, p. 450, t. A, fig. 4, and t. B, fig. 3, 1895 (Rhax).

♀. *Colour.* Head black, mandibles deep blackish brown; thoracic segments yellow, lightly infuscate; upper and lateral surface of abdomen coal-black, lower surface deep brown; legs and palpi uniform clear reddish yellow, the tibia, except for a narrow pale ring at the base, and the tarsus of the palp almost black, and the tarsus and distal half of tibia of 1st leg deep brown; malleoli with fuscous border. *Legs* and *palpi* rather shorter than in *R. semiflavus*; width of head equal to patella and three-fourths of tibia of palpus, almost as long as patella and tibia of 4th leg, and as long as patella, tibia, and tarsus of 3rd; palpus not so much as twice the width of the

head. Spines and spiniform setæ of legs and palpi thinner than in *R. semiflavus.*

♂. Resembling female in colour. *Palpus* twice and a half as long as the width of the head, the latter as long as its patella and one-third of the tibia of the palpus and of 4th leg, or as the patella and about three-quarters of the tibia of the 3rd leg.

Measurements in mm. :—

	Total length.	Width of head.	Length of palp.	Length of 4th leg.	Length of patella, tibia, and tarsus of palp.
♀....	33	10	19·5	28	13·3
♂....	20	6	16	23	10

Loc. N.W. India: Umballah; Dharmsála (*Fulton*); Dera Gházi Khan (*Watts*); Nepal (*Hardwicke*, type)*.

123. **Rhagodes vittatus**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 746, 1899.

♂. *Colour* of head, mandibles, legs, palpi, thoracic terga, and under side as in *R. semiflavus*, but differing from the latter in the colour of the upper and lateral surface of the abdomen; the tergal plates, with exception of the 1st, which is black at the sides, are a uniform clear yellow, the last or anal segment being at most faintly clouded with fuscous below, the sides of the upper surface ornamented by a broad deep black band, which extends from the first tergite to the posterior end of the abdomen, narrowing posteriorly and stopping short before reaching the anal somite. *Head* thickly clothed, especially behind, with long reddish hairs; mandibles as in the male of *R. brevipes*, but with the third tooth of the upper jaw and the large tooth of the lower distinctly smaller. Width of *head* equal to patella and half the tibia of the palp, to patella and one-fourth the tibia of the 4th leg, and to patella and half the tibia of the 3rd. *Legs* and *palpi* spined as in the preceding species, but the coxæ of the 1st, 2nd, and 3rd legs furnished with long, slender, cylindrical, dark-coloured spines.

Measurements in mm.—♂. Total length 22, width of head 6·5, length of palp 16, length of 4th leg 26, patella, tibia, and tarsus of palp 9·5.

Loc. Karaghora in Kathiawar (*Bulkley*).

124. **Rhagodes nigriceps**, *Pocock, Jour. Bom. N. H. Soc.* ix, p. 451, 1895 (Rhax): persicus, *Kraepelin, Jb. Hamb. wiss. Anst.* xvi, p. 211, 1899 (Rhagodes).

♀. *Colour.* Head and upper side of abdomen uniformly deep black, as in *R. brevipes*, with rarely a pale patch on the posterior extremity of the upper side of the abdomen; mandibles clear yellow; legs and palpi coloured as in *R. brevipes*, but with only the tarsus of the palp and 1st leg deep brown, the tibia at most lightly browned.

* Hardwicke's localities are not to be trusted. In the present instance, Nepal is probably erroneous.

Width of *head* equal to patella and three-fourths the tibia of the palpus, almost as long as these segments of the 4th leg, and as long as the patella, tibia, and tarsus of the 3rd leg. Spine-armature of *legs* and *palpi* as in *R. brevipes*, but the tibia of the 4th leg armed in front beneath with two distinct spines in addition to the two at the apex of this segment as in *R. semiflavus*, but the two spines closer together.

♂. With terminal fangs of *mandible* very long, slender, and curved, very noticeably more so than in the males of *R. brevipes* and *R. vittatus*; *flagellum* larger, its terminal portion thicker than in the previously described males. Width of *head* about equal to patella and one-third of tibia of palpus and of 4th leg. *Coxæ* bearing numerous cylindrical spines.

	Total length.	Width of head.	Length of palpus.	Length of 4th leg.	Length of patella, tibia, and tarsus of palp.
♀ ..	26	6·3	13	16·5	9
♂ ..	21	6	16	23	10·2

Loc. East India (type): Northern Baluchistan (*Maynard & MacMahon*); Persia (*Kraepelin*).

125. **Rhagodes nigrocinctus**, *Bernard, Jour. Linn. Soc., Zool.* xxiv, p. 361, pl. xxvi, fig. 2, 1894; *Pocock, Jour. Bom. N. H. Soc.* ix, p. 451, 1895 (Rhax).

♀. *Colour* of upper side of trunk as in *R. vittatus*, the head and mandibles being blackish brown, but there is a conspicuous yellow patch on each antero-lateral angle of the head; terga of thorax yellow, lightly clouded with fuscous; terga of abdomen yellow, the anterior portion of the 1st and 9th black, and the antero-lateral angles of the 6th, 7th, and 8th, and to a lesser degree of the others, blackish; anal somite and sides of abdomen black, lower surface of abdomen deep blackish brown, the median area of the 1st sternum, and the area around the stigmata on the 2nd and 3rd, yellow; malleoli flavous; coxæ of legs and palpi and first trochanter segment of 3rd and 4th legs clouded with dull brown; palpi yellow, with the trochanter and inferior edge of femur black, a black ring round the middle of the patella occupying about one-third of its length, and the distal half of the tibia and the tarsus black; 1st leg yellow, with a black spot on the under side of the femur and patella; tarsus deep brown; 2nd leg with a complete black ring round the femur; 3rd leg with complete femoral ring and a black ring round distal half of patella, but separated by about its own width from the apex of the segment; 4th leg with a broad black femoral ring, incomplete in the middle line above, and a black spot on the posterior side of the patella; there is also a black patch on the upper side of the 3rd and 4th legs, marking their point of attachment to the thorax. Width of head as compared with length of legs and palpi, dentition of mandibles, and spine-armature of legs as in *R. nigriceps*.

Measurements in mm.— ♀. Total length 23, width of head 6, length of palpus 13, length of 4th leg 16, patella, tibia, and tarsus of 4th 8.

Loc. Southern India: Vellore.

126. **Rhagodes annulatus**, *Simon, Bull. Soc. Zool. Fr.* x, p. 2, 1885; *Pocock, Jour. Bom. N. H. Soc.* ix, p. 452, 1895 (Rhax).

This species is unknown to me, but, judging from the description, it is closely related to *R. nigrocinctus*. It may, however, be provisionally regarded as distinct on the grounds that Simon does not mention the presence of a yellow patch on each anterior lateral angle of the head, nor the blackness of the lower side of the femur of the palp, nor the black spot on the lower side of the femur and patella of the 1st leg, nor on the posterior side of the patella of the 4th leg.

Loc. Wagra-Korur, near Guntakal in the Bellary District.

127. **Rhagodes phipsoni**, *Pocock, Jour. Bom. N. H. Soc.* ix, p. 448, t. A, fig. 3, and t. B, fig. 4, 1895 (Rhax).

♀. *Colour* much like that of *R. vittatus*; head and mandibles deep reddish brown; abdomen tolerably uniform whitish yellow, the terga a little darker than the lateral surface, but there is no black lateral band such as is present in *R. vittatus*; legs and palpi yellow, with tibia and tarsus of palp and 1st leg brown and becoming browner towards the distal extremity. *Palpi* and *legs* shorter than in any of the Indian species; width of head equal to length of patella and tibia of palp, very slightly longer than these segments of the 4th leg, and longer than patella, tibia, and tarsus of the 3rd; palpus much less than twice as long as the width of the head. Spine-armature of legs as in the other species, but with one additional stout brown spine (rarely two) at the apex of the patella of the 2nd and 3rd legs, behind and below the normal superior spine. Spines on tibia of 4th as in *R. nigriceps*, but with an additional spine on the posterior side of the segment on the proximal side of the normal posterior apical spine; the two spiniform setæ on the apex of the tibia beneath long, but the anterior much thicker than the posterior.

♂. Resembling the female in *colour*, except that the base of the tibia of the palpus and the whole of the segment of the 1st leg is yellow; spine-armature of legs as in female. Width of *head* equal to tibia and about one-third of patella of palpus, and to tibia and about one-sixth of patella of 4th leg, and to tibia and two-thirds of patella of 3rd leg.

Measurements in mm.—

	Total length.	Width of head.	Length of palpus.	Length of 4th leg.	Length of patella, tibia, and tarsus of palp.
♀ ..	64*	14·5	25·5	36	17
♂ ..	32	8·5	21	32	12

Loc. Ceylon: Trincomali (*Bombay N. H. Soc.*).

* Abdomen much distended.

Order ARANEÆ.

Integument usually covered with a protective layer of simple or feathery (*plumose*), rarely scale-like (*squamiform*) hairs, interspersed with long erect tactile bristles or *setæ*. Short and thick bristles form *spines* or *spinules*. A mat of close-set hairs of uniform length is termed a pad or *scopula*, and the bunch of hairs that frequently projects ou each side of the claws is called the *ungual tuft*. On the protarsus of the 4th leg there is frequently a single or double row of short hairs, forming an organ called the *calamistrum*, which always accompanies the *cribellum* (p. 154). In some cases there is a cluster of spines (*rastellum*) overhanging the base of the fang on the mandible, and in connection with the jaws there are sometimes spines or bristles variously modified to form stridulating-organs.

The *carapace* is marked with a groove or pit, the *thoracic fovea*, from which shallow grooves usually radiate to the margins, the anterior pair defining the head-region. The *eyes*, normally 8 in number, are typically arranged in an anterior and posterior row, and are termed *anterior median*, *posterior median*, *anterior lateral*, and *posterior lateral* on each side. The eye-line, or line passing through the centres of the four eyes of a row, may be *straight*, *procurved* (*i. e.*, curved with the convexity backwards), or *recurved* (*i. e.*, curved with the convexity forwards). The four median eyes are termed the *ocular quadrangle*. The area, if any, between the anterior row of eyes and the edge of the carapace is called the *clypeus*.

The *mandibles* consist of two segments, the basal containing a poison-gland; the apical or *fang* is spiniform and closes against the lower side of the basal segment, fitting into a groove, the *fang-groove*, which is often toothed. The *palpi* resemble dwarfed limbs, and consist of six segments, named *coxa*, *trochanter*, *femur*, *patella*, *tibia*, *tarsus*. The *coxa* is usually furnished with a large process or *maxilla*, which projects forwards on each side of the *labium*. The tarsus is unmodified in the female. In the male it is modified to subserve copulation, and is furnished with an intromittent or *palpal organ*, which is often retractile and exceedingly complicated. At its simplest it is not retractile, and consists of a swollen basal portion or *bulb*, and of a terminal portion or spine. The *legs* resemble the palp of the female, but are longer, have simple coxæ, an extra segment, the *protarsus*, between the tibia and tarsus, and two or three claws at the end of the tarsus. The third or inferior claw is usually present when the ungual tufts are absent, absent when they are present. The *sternum* is usually oval, and supports in front the lower lip or *labium* (= *pro-sternum*). Sometimes the sternum is marked with muscular scars or *sigilla*.

The cephalothorax is connected with the abdomen by a narrow stalk or *pedicel*.

Typically the *abdomen* is soft-skinned and oval in form. Not infrequently it is horny, and occasionally it is segmented. The *generative organs* and anterior pair of breathing-organs open ventrally along a curved groove, the *genital fold*, which marks off the fore part of the abdomen as the *epigastric area*. These breathing-organs or pulmonary sacs are covered by plates or *opercula*, and the integument in front of the genital aperture is in many females horny and variously modified to form an organ, the *vulva* or *epigyne*. The breathing-organs of the posterior pair are either operculate pulmonary sacs or tracheal tubes with simple apertures, which rarely open separately behind the genital fold, but more commonly unite to form a single aperture situated just in front of the spinning-mamillæ. There are usually three pairs of *spinning-mamillæ* attached to the hinder end of the lower surface of the abdomen—an *anterior*, a *posterior*, and an *intermediate pair*. Each of the latter consists of a single segment, the others of two or three segments. In one instance (*Liphistius*) there is an additional intermediate pair. In other cases the mamillæ may be reduced to four or two pairs. In some species there is a spinning-plate, the *cribellum*, situated in front of the anterior mamillæ. This organ occurs only in those spiders which possess the *calamistrum* (p. 153). In other species there is a mamilliform process, the *colulus*, lodged between the anterior mamillæ, and behind the posterior mamillæ there is a small prominence, the *anal papilla*.

Sexual characters, etc. Males are almost invariably smaller, sometimes very much smaller, than females, and may be always recognized by the modification of the tarsus of the palp to act as an intromittent organ. This organ appears only at maturity. Similarly in the female the genital aperture is opened and the vulva fully formed only at the last moult, when maturity is reached.

All Spiders are oviparous. The eggs are enveloped in a silky cocoon, and are disposed of in various ways by the mother.

Distribution. Spiders are cosmopolitan, occurring in all oceanic islands, and as far north as Greenland and Spitzbergen.

Measurements, etc. In the following descriptions the total length is taken from the anterior end of the carapace to the posterior end of the abdomen; that of the legs from the base of the femur to the tip of the claws. Normally the anterior two pairs of legs project forwards, and the posterior two pairs backwards. Hence the surface nearest the body is regarded as inner, and the opposite surface as outer. Sometimes, however, the legs are considered as extending at right angles to the long axis of the body. In this case they have an anterior and a posterior side. In many species the legs are normally depressed backwards in such a way that the posterior surface rests upon the ground. These spiders are capable of moving sideways, and are hence termed "laterigrade."

The Araneæ are divisible into two groups, which may be tabulated as follows:—

a. Abdomen furnished with 9 distinct terga like those of the Amblypygi; spinning-mamillæ 8 in number, and situated in the middle of the lower surface of the abdomen	MESOTHELÆ.
b. Abdomen without terga; spinning-mamillæ never more than 6, and situated at the posterior end of the abdomen	OPISTHOTHELÆ.

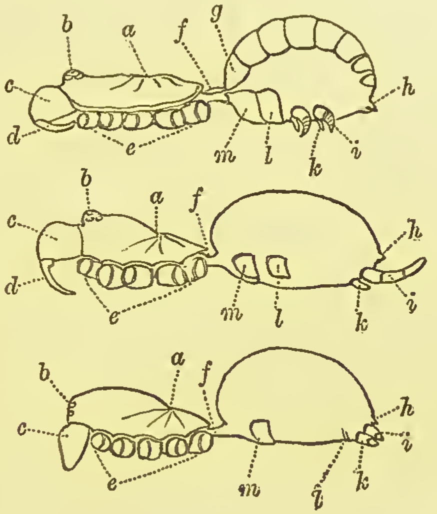


Fig. 52.

A. Cephalothorax and abdomen of *Liphistius*, to show structure of the Mesothelæ.
B. Ditto of one of the Mygalomorphæ, to show structure of this group.
C. Ditto of one of the Arachnomorphæ, to show structure of this group.

a, thoracic fovea; *b*, ocular area; *c*, basal segment of mandible; *d*, fang of mandible; *e*, coxæ of palpus and legs; *f*, pedicel; *g*, 1st tergal plate of abdomen; *h*, anal papilla; *i*, external, *k*, internal branch of posterior spinning-organ in A, and anterior and posterior spinner in B and C; *l*, posterior, and *m*, anterior breathing-organ.

MESOTHELÆ.

Abdomen segmented, its dorsal surface furnished with distinct *terga*, its ventral surface with two distinct *sterna* in front, the anterior covering the generative aperture and the pulmonary organs of the 1st pair, the 2nd covering the pulmonary organs of the 2nd pair. *Spinning-mamillæ* 8 in number, 4 external segmented and 4 internal unsegmented, forming a cluster in the middle of the lower surface of the abdomen immediately behind the second sternum.

The Mesothelæ are represented at the present day by a single family and genus.

Family LIPHISTIIDÆ.

Mandible jointed to the cephalothorax in a vertical plane; the fang, when closed, directed obliquely backwards and inwards. No *maxillary process* on coxa of palp. *Sternum* very narrow, much longer than wide, without distinct sigilla. *Legs* with distal segments strongly spined, not scopulate, furnished with 3 claws. *Carapace* flat, lightly elevated in the cephalic region; fovea transversely oval; radiating grooves strongly defined. *Eyes* aggregated on a distinct tubercle; anterior medians minute, posterior medians large and circular, anterior and posterior laterals long and reniform.

Distribution. Oriental Region, from Burma and the Malay Peninsula to Sumatra.

Genus **LIPHISTIUS**, Schiödte.

Liphistius, *Schiödte, Nat. Tijdschr.* (2) ii, p. 621, 1849; *Simon, Hist. Nat. Araign.* i, p. 64, 1892.

Characters and distribution as above.

Type. *L. desultor*, Schiödte; Penang.

128. **Liphistius birmanicus**, *Thorell, Ann. Mus. Genova*, xxxvii, p. 162, 1897.

♀. *Colour* blackish, sometimes varied with greyish yellow. *Carapace* as long as patella and tibia of the 4th leg. *Legs* 4, 3, 2, 1 in length; 1st, 2nd, and 3rd subequal; 4th about three times, 1st a little more than twice, as long as the carapace. Claw of palp and inferior claw of legs armed with 2–3 small teeth; superior claws of legs with 3–4 larger teeth.

Measurements in mm.—Total length 24, carapace 11, palp 18, 1st leg 23, 2nd 23·25, 3rd 24, 4th 32·50.

Loc. Burma: Yado, in the mountains of Karennee, 3600–3900 feet; Biapó, 3000–3200 feet (*Fea*).

OPISTHOTHELÆ.

Dorsal surface of *abdomen* without segmentally arranged tergal plates, and without distinct sternal plates beneath, the sterna of the Mesothelæ being at most represented by the pulmonary opercula. *Spinning-mamillæ* never more than six in number, and, at least in all the Indian species, forming a compact or tolerably compact group at the posterior end of the abdomen, close to the anal papilla.

The Opisthothelæ are divisible into two Suborders, which may be diagnosed as follows :—

a. Basal segment of mandible projecting forwards from the fore extremity of the cephalothorax, its articulation lying in a vertical plane; fang closing backwards . . . . MYGALOMORPHÆ.
b. Basal segment of mandible projecting downwards beneath the extremity of the cephalothorax, its articulation lying in a horizontal plane; fang closing more inwards . . . . ARACHNOMORPHÆ.

Suborder *MYGALOMORPHÆ.*

Basal segment of *mandible* large, projecting forwards, articulated to the cephalothorax in a vertical plane; fang closing obliquely backwards. *Respiratory organs* represented by four operculate pulmonary sacs. *Spinning-mamillæ* normally four in number—a posterior longer three-jointed, and an anterior shorter one-jointed on each side; rarely the latter is absent, and occasionally an additional small anterior mamilla is present, making a total of 6. *Sternum* marked with 4, rarely 3, pairs of sigilla. *Palpal organ* in male non-retractile, simple, usually without accessory process. *Genital aperture* of female without horny plate (vulva).

Distribution. Temperate and tropical countries.

Habits. Mostly ground-spiders, living in burrows, and frequently closing the aperture with a movable lid.

The Indian Mygalomorphæ are referable to the following families :—

a. Coxa of palp with large maxillary process; spinning-mamillæ 6 . . . . **Atypidæ.**
b. Coxa of palp without large maxillary process; spinning-mamillæ not more than 4.
  *a*¹. Tarsi without ungual tufts; armed with 3 claws, the superior of which are strongly toothed.
    *a*². Posterior mamillæ short or moderately long; anterior mamillæ close together at base; a rastellum present on mandible . . . . **Ctenizidæ.**
    *b*². Posterior mamillæ very long; anterior mamillæ widely separated at base; no rastellum . . . . **Dipluridæ.**
  *b*¹. Tarsi with ungual tufts, inferior claw almost always absent; superior claws at most weakly toothed.
    *a*³. Distal segment of posterior mamillæ very short, rastellum almost always present . . **Barychelidæ.**
    *b*³. Distal segment of posterior mamillæ long and slender, rastellum never present . . . . **Theraphosidæ.**

Family ATYPIDÆ.

Coxa of *palp* furnished with large maxillary process. *Spinning-mamillæ* 6 in number. *Carapace* very broad in front, with median conical ocular tubercle. *Mandible* very large, without rastellum. *Sternum* with anterior sigilla not forming a groove at the base of the labium. *Legs* weakly spined, furnished with 3 claws. Spine of *palpal organ* in male protected by a secondary outgrowth from the bulb.

Distribution. Palæaretic Region from Ireland to Japan; Oriental Region from Burma to Java; Sonoran Region of North America.

Synopsis of Indian Genera.

Maxillæ short, eyes close together	ATYPUS, p. 158.
Maxillæ long, eyes scattered	CALOMMATA, p. 159.

Genus ATYPUS, Latreille.

Atypus, *Latr. Nouv. Dict. d'Hist. Nat.* xxiv, p. 133, 1804; *Simon, Hist. Nat. Araign.* i, p. 198, 1892.

Ocular area tolerably compact; the *tubercle* low; *clypeus* narrow. *Maxillæ* relatively short and stout, with inner edge straight. *Labium* not separated by a groove from the sternum, narrower at apex than at base. Posterior *mamillæ* three- or four-jointed.

Type, *A. piceus*, Sulzer; Central and Western Europe.

Distribution. Central and Southern countries of the Palæarctic Region from Ireland to Japan; North America; Burma and Java.

Habits. The spiders of this genus dig burrows, line them with silk, and continue the silk above the surface of the ground in the form of a long tube, with a small aperture at its extremity.

129. **Atypus dorsualis,** *Thorell, Ann. Mus. Genova,* xxxvii, p. 186, 1897.

♀. *Colour* yellowish black; sides of abdomen darker. *Carapace* as long as patella, tibia, and protarsus of 1st and 4th legs; *eyes* of anterior line subequal, posterior laterals almost as large as the anterior laterals; anterior medians separated by a space, which is greater than their diameter, nearer to the anterior laterals; lateral eyes in contact. *Legs* without spines.

Measurements in mm.—Total length 17·5, carapace 6·5, palpus 5·5, 1st leg 13, 2nd 11·5, 3rd 10·5, 4th 13·5.

Loc. Burma: Yado, in the mountains of Karennee (*Fea*).

Genus CALOMMATA.

Calommata, *Lucas, Ann. Soc. Ent. Fr.* vi, p. 378, 1837.
Pelecodon, *Dolesch. Verh. Nat. Vereen Nederland Indië*, v, no. 5, p. 5, 1859.
Camptotarsus, *Thorell, Ann. Mus. Genova*, (2) v, p. 23, 1887.

Eyes much less compact than in *Atypus*, the anterior medians situated on a high prominence, the rest forming a cluster on each

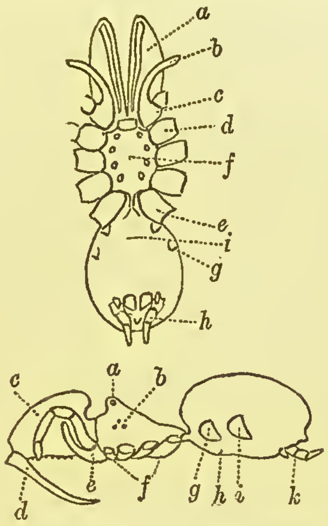


Fig. 53.—A. Ventral view of cephalothorax and abdomen of *Calommata fulvipes*, ♀.

a, basal segment of mandible; *b*, maxillary process; *c*, coxa of palp; *d*, coxa of 1st, *e*, of 4th leg; *f*, sternum with four pairs of muscular scars (*sigilla*); *g*, posterior respiratory stigma; *i*, genital aperture; *h*, posterior spinner with the two anterior pairs immediately in front of it.

B. Lateral view of the same.

a, median, *b*, lateral eyes; *c*, basal segment of mandible; *d*, fang; *e*, coxa of palp; *f*, coxæ of legs; *g*, anterior, *i*, posterior respiratory operculum; *h*, genital aperture; *k*, posterior spinner.

side, remote from the anterior medians. *Clypeus* long and nearly horizontal. *Maxillæ* very long, slender, arched outwards from the base. *Labium* transversely oblong, impressed at the base. Posterior *spinners* three-jointed. Posterior *legs* stouter than anterior; tarsi in the male slender and flexible.

Type, *C. fulvipes*, Lucas.

Distribution. Japan, Burma, Sunda Islands.

130. **Calommata truculentum**, *Thorell, Ann. Mus. Genova*, (2) v, p. 24, 1887 (Camptotarsus); *Simon, Hist. Nat. Araign.* i, p. 199, 1892 (Calommata).

♂. *Colour* blackish; legs, mandible, and ventral surface paler than body. *Carapace* but little longer than patella and tibia of

4th leg. Anterior median *eyes* much larger than the rest, almost in contact. *Palpi* long; tibia much thicker than patella; tarsus elongate, apically truncate; spines of palpal organ sinuous, broad at base, then abruptly bent backwards, one rising from the extremity of the bulb, the other near its middle. *Legs* of posterior pairs furnished distally with a few spinules; superior claws armed with about 5 teeth.

Measurements in mm.—Total length 6, carapace 2·5, palp 4·25, 1st leg 9·5, 2nd 8·8, 3rd 8·2, 4th 10·75.

Loc. Burma: Bhamo (*Fea*).

Family CTENIZIDÆ.

Mandibles furnished with *rastellum*, sometimes supported on a strong prominence. *Coxa* of *palpus* without large maxillary process. *Sternum* with anterior sigilla large and encircling base of labium; posterior pair large and remote from margin; rarely absent. *Tarsi* without ungual tufts; with 3 claws. *Spinning-mamillæ* 4 in number; the anterior pair contiguous; posterior pair short or of moderate length.

Distribution. Temperate and tropical parts of the world, lying in general between 45° N. lat. and 45° S. lat.

To this family belong a great majority of the species commonly spoken of as Trap-door Spiders.

The characters of the Indian genera may be briefly tabulated as follows:—

a. Anterior lateral eyes in middle of anterior edge of carapace well in advance of remaining eyes.
- a^1. Tibia of 3rd leg not excavated above ...... ACANTHODON, [p. 161
- b^1. Tibia of 3rd leg excavated above at base .. HELIGMOMERUS, [p. 164.

b. Anterior lateral eyes widely separated, at most only a short distance in advance of anterior medians.
- a^2. Thoracic fovea strongly procurved.
  - a^3. Tarsi and protarsi of legs scarcely or not scopulate, and strongly spined laterally; apical segment of posterior mamillæ short.
    - a^4. Tibia of 3rd leg excavated above; spines of rastellum set on prominence .. CONOTHELE, p. 165.
    - b^4. Tibia of 3rd leg not excavated above; spines of rastellum not set on prominence .... ACATTYMA, p. 166.
  - b^3. Tarsi and protarsi scopulate, weakly spined, apical segment of posterior spinners long.
    - a^5. Sternum with central depression...... ATMETOCHILUS, [p. 168.
    - b^5. Sternum without central depression .. DAMARCHUS, p. 169.
- b^2. Thoracic fovea recurved.
  - a^6. Lateral eyes narrowly separated........ SCALIDOGNATHUS, [p. 166.
  - b^6. Lateral eyes widely separated .... NEMESIELLUS, [p. 167.

Genus **ACANTHODON**, Guérin.

Acanthodon, *Guérin, Rev. Zool.* 1838, p. 10; *Simon, Hist. Nat. Araign.* i. p. 91, 1892.
Idiops *of recent authors up to* 1892 (*not of Perty*).

Carapace polished, scantily hairy; fovea large, strongly procurved; head high; anterior lateral *eyes* situated in the middle of the anterior border of the carapace; the remaining eyes forming a group far behind the anterior edge of the carapace. *Mandible* powerful; *rastellum* consisting of stout spines borne upon a distinct prominence. *Sternum* with posterior sigilla obsolete. *Legs* in female short and stout, claws armed with 1 or 2 large basal teeth; distal segments of legs not scopulate, those of the anterior pairs and of palpi thickly spined laterally; tibia of 3rd not depressed above at base. Apical segment of posterior *spinning-mamillæ* short.

♂. Carapace lower, rugose; legs long and slender.

Type, *A. petiti*, Guérin.

Distribution. S. America; Tropical Africa; Syria, Arabia, India and Burma.

Synopsis of Indian Species.

Females.

a. Coxa of 4th leg without band of spinules; tibia of 3rd longer than wide.
  a¹. Ocular tubercle elevated in front .... *A. crassus*, p. 161.
  b¹. Ocular tubercle not elevated in front ...... *A. opifex*, p. 162.
b. Coxa of 4th leg with band of spinules below; tibia of 3rd as wide as long.
  a². Eyes of posterior line subequally spaced .. *A. fortis*, p. 163.
  b². Eyes of posterior line unequally spaced .... *A. constructor*, [p. 163.

Males.

a. Tibia of 1st leg armed with a stout, pointed, and bent spur, and a tubercle behind it .... *A. constructor*, [p. 163.
b Tibia of 1st leg armed with a low prominence tipped with a long spine, and a small tubercle above it.
  a′. 4th leg only a little longer than the 1st; protarsus of 1st strongly concave in its basal half on inner side .... *A. fossor*, p. 164.
  b′. 4th leg considerably longer than 1st; protarsus of 1st weakly concave in its basal half on inner side .... *A. designatus*, p. 164.

131. **Acanthodon crassus**, *Simon, Ann. Mus. Genova*, xx, p. 357, 1884 (Idiops): colletti, *O. P. Cambr. P. Z. S.* 1889, p. 37, pl. ii, fig. 2 (Idiops).

♀. *Colour*: carapace, etc. mahogany-red, legs paler; abdomen

blackish. *Carapace* a little shorter than patella, tibia, and protarsus of 1st leg; ocular tubercle elevated in front; *eyes* of posterior row very unequally spaced, their posterior edges in a straight line; medians about four diameters apart, and less than

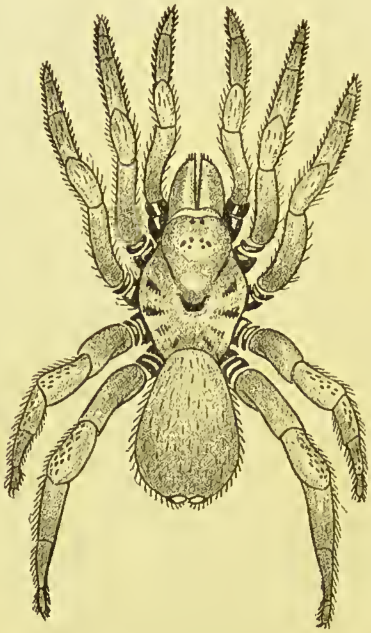


Fig. 54.—*Acanthodon crassus*, Sim., ♀, × 1½.

two from the laterals; anterior medians about a diameter apart. *Labium* with three teeth. *Legs*: coxa of 4th not spinulose below; tibia of 3rd longer than wide.

Measurements in mm.—Total length 26, carapace 13, palp 21; 1st leg 24, 2nd 22, 3rd 23, 4th 30; patella and tibia of 1st 10, of 4th 11·5.

Loc. Burma: Minhla (*Comotto*); Tharrawaddy (*Oates*); Palon (*Fea*); Meiktila (*Collett*).

Simon doubtfully refers to this species some immature specimens of *Acanthodon* procured at Wagra-Karur, near Guntakal, Bellary (Bull. Soc. Zool. Fr. x, p. 23, 1885).

132. **Acanthodon opifex**, *Pocock, Journ. Bom. N. H. Soc.* xii, p. 750, 1899.

Allied to the preceding, but darker in colour. *Postocular area* more strongly elevated than in *A. crassus*; ocular tubercle flat above; posterior median *eyes* less than three diameters apart, and more than one diameter from the posterior laterals; anterior medians more than a diameter apart, and nearly two diameters

from the posterior laterals; anterior laterals more prominent than in *A. crassus.*

Measurements in mm.—Total length 20, length of carapace 10, of 1st leg 19, of 4th leg 23.

Loc. Bombay (*Phipson*).

133. **Acanthodon constructor**, sp. n.

♀. *Colour* as in *A. opifex.* *Carapace* with ocular tubercle elevated in front as in *A. crassus*; *eyes* of posterior line unequally spaced, the medians a little more than two diameters apart, and about one diameter from the laterals, about the same distance from the anterior medians to which they are subequal in size; the anterior medians about a diameter apart, their posterior edges on a level with the anterior edges of the posterior laterals. *Labium* with a marginal row of 4–5 teeth, and some smaller ones behind them. Coxa of 4th *leg* furnished beneath with a median longitudinal band of short spinules; tibia of 3rd leg short and thick, as wide as long.

♂. *Colour* as in ♀, but tarsi and protarsi of legs clear yellow. *Eyes* more compact; posterior medians about two diameters apart. First *leg* with tibia incrassate, armed externally with 8–10 spines, internally in its basal half with 3 spines, and at the apex with 2 spurs, the proximal conical, the distal stout, but with the apex pointed and directed forwards and upwards; protarsus slender, concave in its basal half, armed with many spines below, and with a submedian conical spur. Tibia of *palp* inflated, furnished distally on the outer side with a cavity bordered above by a complete semicircle of short spines; tarsus with a conical external process: spine of palpal organ broad at base, slender and bent distally with blunt tip.

Measurements in mm.—♀. Total length 19, carapace 8, 1st leg 14, 4th leg 17. ♂. Total length 12, carapace 6, 1st and 4th legs 20.

Loc. S. India: Chingleput (*Jambunathan*); Yercaud in Shevaro Hills (*Henderson*).

134. **Acanthodon fortis**, sp. n.

♀. Resembling *A. constructor*, but much larger; and with the *eyes* of the posterior line widely and subequally spaced, the medians nearly three diameters from each other and from the laterals; anterior medians large, less than a diameter apart; posterior medians about their own diameter from the anterior medians; posterior laterals large, elliptical, set far forwards, so that their anterior rims are on a level with the centres of the anterior medians.

Measurements in mm.—Total length 32, carapace 14, 1st leg 26 4th leg 32.

Loc. India (*Godfry*, type; *Hardwicke*).

135. **Acanthodon fossor**, sp. n.

♂. Carapace smoother than in *A. constructor*, with posterior median eyes more than three times their transverse diameter apart. Tibial apophysis of 1st *leg* consisting of a low process bearing a slender, distally pointed and bent spine, behind the process there is a small tubercle; protarsus with very few spines, the process much shorter, tuberculiform. *Palp* with protarsus less inflated, hollow, shallower, and bordered above by a thick cluster of spines; spine of palpal organ evenly arched, with an outward apical bend and a slight subapical thickening, when curled back at rest the concavity of the spine faces forward and the point forward and outward.

Measurements in mm.—Total length 12, carapace 6, 1st leg 21, 4th leg 21.

Loc. India: the Deccan.

136. **Acanthodon designatus**, *Cambridge, Araneidea, Second Yarkand Exped.* p. 3, pl. i, fig. 1, 1885 (Idiops).

Judging from the description and figures, this species is most nearly allied to *A. fossor*, but has the anterior legs much shorter, the 1st pair being much shorter than the 4th and only two and a half times the length of the carapace. Moreover, the protarsus of the 1st leg is thicker and much less concave in its basal half; the tibial apophysis is directed upwards from its base; and the palpal organ rests with the convexity of the spine looking forwards. Length of carapace about 6 mm.

Loc. Murree (*Stoliczka*).

Genus **HELIGMOMERUS**, Simon.

Heligmomerus, *Simon, Hist. Nat. Araign.* i, p. 90, 1892.

Differs from the genus *Acanthodon* in having the upper side of the tibia of the 3rd leg excavated and smooth in its basal half.

Type, *H. taprobanicus*, Simon.

Distribution. India, Ceylon; Tropical Africa.

Synopsis of Indian Species.

a. Only the internal (anterior) claw of 1st and 2nd legs armed with a bifid tooth .... *H. taprobanicus*, p. 164.

b. All the claws armed with a bifid tooth .... *H. prostans*, p. 165.

137. **Heligmomerus taprobanicus**, *Simon, Hist. Nat. Araign.* i, p. 91, 1892.

Colour: carapace blackish; abdomen violet-black, paler beneath; sternum, mouth-parts, and appendages olive-yellow. Anterior

median and posterior lateral *eyes* subequal, equidistant, and separated by spaces not or scarcely exceeding the diameter of an eye. *Labium* armed with a row of three larger and also with a few smaller teeth. *Legs* with claws of anterior pairs strong, the exterior armed with a simple basal tooth, the interior with a double tooth; claws of posterior legs armed with a single tooth.

Length 14 mm. (young female).

Loc. Ceylon: Kandy (*Simon*).

138. **Heligmomerus prostans**, *Simon, Hist. Nat. Araign.* i, p. 91, 1892.

Differs from the foregoing in having the anterior median and posterior lateral eyes farther apart from each other, and the medians evidently smaller than the laterals. Tarsal claws thicker, all of them armed at the base with an unequally bifid tooth. Labium armed with only three teeth.

Length 21 mm. (adult ♀).

Loc. S. India: Kodaikanál, Palni Hills (*Simon*).

Genus **CONOTHELE**, Thorell.

Conothele, *Thorell, Ann. Mus. Genova,* xiii, p. 303, 1878; *Simon, Hist. Nat. Araign.* i. p. 88, 1892.

Resembling *Acanthodon*, but with the *eyes* normally arranged near the anterior border of the carapace; the anterior laterals close to the posterior laterals; eyes of anterior line procurved. *Mandibles* not so prominent, depressed. *Sternum* with posterior sigilla distinct and remote from the margin. *Legs* as in *Heligmomerus*. Carapace of male rugose; labium and maxillæ less strongly toothed than in female; legs longer, less strongly spined, with anterior tarsi scopulate; palpi long, the tarsus short and truncate.

Type, *C. malayana*, Doleschall.

Distribution. Burma to the Solomon Islands.

Habits. So far as is known, the species of this genus build their trap-door nests on the trunks of trees, spinning a silken tube in a depression of the bark and covering the white silk with bits of lichen and moss.

139. **Conothele birmanica**, *Thorell, Ann. Mus. Genov.* (2) v, p. 19, 1887.

♀ (young). *Colour*: carapace and abdomen blackish, legs and sternum paler. *Carapace* considerably longer than patella and tibia of 1st and of 4th legs; ocular area twice as wide as long; *eyes* of posterior line straight, diameter of anterior medians much less than long diameter of anterior laterals. *Labium* with 5 teeth. Tibiæ of anterior *legs* without external apical area of spinules such as occurs in other species of the genus.

Measurements in mm.—Total length 11, carapace 5·5, 1st leg 11·25, 4th leg 12·75.

Loc. Burma : Shwegoo-Myo (*Fea*).

Genus ACATTYMA, L. Koch.

Acattyma, *L. Koch, Verh. z.-b. Ges. Wien*, xxvii, 1877, p. 760; *Simon, Hist. Nat. Araign.* i. p. 96, 1892.

Differing from *Conothele* in having the mandibles strong and prominent; the rastellum consisting of many irregularly-arranged teeth not borne upon a conical process overhanging the base of the fang, and the tibia of the 3rd leg without superior basal depression.

Type, *A. roretzi*, Koch.

Distribution. Japan ; India.

140. **Acattyma cryptica**, *Simon, Mém. Soc. Zool. Fr.* x, p. 253, 1897.

♂. *Colour* blackish, lower side and extremity of legs paler. *Carapace* rugose; *eyes* of anterior line nearly equidistant, medians half as large as laterals. *Labium* with 4–5 teeth. *Mandibles* armed with two rows of large granules ; rastellum composed of a single row of 7–8 teeth. *Legs* with femora coriaceous beneath, copiously spined, the anterior more so than the posterior; claws with a few subbasal teeth; tibia of 1st without spurs. *Palpi* slender, long, unarmed ; the tibia inflated beneath at base, apically attenuate ; tarsus truncate; palpal organ with spine arcuate, thick at base, filiform at apex.

Length 15 mm.

Loc. India : Deccan * (*Smythies*).

Genus SCALIDOGNATHUS, Karsch.

Scalidognathus, *Karsch, Berl. ent. Zeits.* xxxvi, p. 269, 1892 ; *Simon, Hist. Nat. Araign.* i, p. 116, 1892.

♀. *Carapace* with fovea large, recurved; ocular area twice as wide as long; *eyes* of anterior line slightly procurved, the laterals on each side narrowly separated. *Mandibles* armed below with a single row of teeth ; *rastellum* consisting of simple stout spines. *Labium* and *maxillæ* unarmed; posterior sternal sigilla small, remote from the margin. *Legs* short, spiny ; tarsi and protarsi of 1st and 2nd scantily scopulate; tarsi of all legs armed with spines; claws armed with a single long tooth.

♂. *Legs* much longer; claws armed with many teeth, forming a single series.

Type, *S. radialis*, O. P. Camb.

Distribution. S. India and Ceylon.

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* Probably an error for Dehra.

Synopsis of Species (males).

a. Superior claws of anterior two pairs of legs armed with 7 teeth .... *S. radialis*, p. 167.
b. Superior claws of anterior two pairs of legs armed with 11 teeth .... *S. oreophilus*, p. 167.

141. **Scalidognathus radialis**, *O. P. Cambr. Jour. Linn. Soc., Zool.* x, p. 373, pl. xi, fig. 1, 1870, ♂ (Mygale): seticeps, *Karsch, Berl. ent. Zeits.* xxxvi, p. 269, t. x, fig. 1, ♀ (1892).

♂. *Colour* reddish yellow; abdomen blackish above. *Carapace* as long as patella and tibia of 2nd leg. *Legs* long and slender; 1st with protarsus lightly arched, weakly spined; tibia without apophysis, with one of the apical spines beneath stronger than the rest. *Palp* with tibia long, inflated, furnished at the apex externally with a deep spine-bordered notch; spine of palpal organ broad at base, filiform and strongly curved distally.

♀. *Carapace* as long as tibia and protarsus of 4th leg. *Legs* 4, 1, 2, 3 in length, slender; tarsi and protarsi of 1st and 2nd scopulate internally, spined externally.

Measurements in mm.—♂. Total length 10, carapace 5, 1st leg 16, 2nd 15, 3rd 13, 4th 18·5. ♀. Total length 16·22.

Loc. Ceylon: Peradeniya (*Sarasin*), Punduloya (*Green*).

142. **Scalidognathus oreophilus**, *Simon, Hist. Nat. Araign.* i. p. 116, 1892 (in note).

♂. Described as differing from *S. radialis* in having the superior tarsal claws of the anterior legs furnished with 11 instead of with 7 teeth.

Loc. Ceylon (*Simon*).

Genus NEMESIELLUS, nov

Differing from *Scalidognathus* and approaching the Australian genus *Arbanitis* in having the *eyes* of the anterior line strongly procurved, the anterior edge of the medians on a level with the posterior edge of the laterals, the laterals on each side being widely separated by a space which exceeds the long diameter of the anterior lateral. Differing from *Arbanitis* and resembling *Scalidognathus* in having the tarsi of the anterior legs spined.

Type, *N. montanus*, sp. n.

Distribution. S. India.

143. **Nemesiellus montanus**, sp. n.

♀. *Colour*: carapace, mandibles, and upper side of femora deep brown, the remaining part of the appendages reddish yellow. *Carapace* as long as patella, tibia, and protarsus of 1st, longer than patella and tibia of 4th; eyes of anterior line subequal. *Legs* with

tarsus and protarsus of anterior pairs, as well as tarsus of palp, scopulate at sides; patella of 3rd leg thickly hairy above, longer than the tibia.

Measurements in mm.—Total length 14, carapace 5, 1st leg 9·5, 2nd 8·5, 3rd 7·5, 4th 13.

Loc. S. India: Yercaud in Shevaroy Hills (*Henderson*).

Genus **ATMETOCHILUS**, Simon.

Atmetochilus, *Simon, J. A. S. B.* lvi, p. 109, 1887; *id. Hist. Nat. Araign.* i. p. 109, 1892.

Carapace with deep lateral cephalic impressions and deep strongly procurved fovea; ocular area three times as wide as long; eyes of anterior line very slightly procurved. *Mandibles* with single row of teeth below; rastellum consisting of simple slender spines. *Legs* and *palpi* weakly spined; tarsi and protarsi of anterior pairs spined: claws basally toothed. *Labium* scarcely as long as wide, unarmed, coxæ of palp with a few basal teeth. *Sternum* with a transverse depression behind the labium; the three pairs of sigilla remote from the margin, their inner ends continuous with a smooth central depression. Posterior *mamillæ* long, apical segment as long as the 2nd, or longer.

Type, *A. fossor*, Simon.

Distribution. Southern Burma.

Synopsis of Species.

a. Protarsus of 1st leg scopulate to base, of 2nd scopulate in its distal half; length about 40 mm. *A. fossor*, p. 168.

b. Protarsus of 1st leg not scopulate to base, of 2nd without scopula; length about 20 mm. ...... *A. atriceps*, p. 169.

144. **Atmetochilus fossor**, *Simon, J. A. S. B.* lvi, p. 109, 1887.

Colour: carapace reddish brown; legs paler, with clear red naked dorsal bands; abdomen blackish. *Carapace* narrowed in front, width of head less than length of area between eyes and fovea, as long as patella, tibia, and one third of protarsus of 1st and 4th legs; anterior median *eyes* half a diameter apart and twice as far from the laterals. *Sternum* longer than wide. *Palp* with tarsus scopulate distally. *Legs* of 1st and 2nd pairs with patella and tibia spined internally, protarsus of 1st scopulate to base, of 2nd not scopulate to base. Apical segment of posterior *mamillæ* nearly twice as long as 2nd segment.

Measurements in mm.—Total length 43, carapace 20, 1st leg 46, 2nd 42, 3rd 36, 4th 49.

Loc. Tavoy in Tenasserim (*Moti Ram*).

145. **Atmetochilus atriceps**, sp. n.

Damarchus oatesii, *Thorell, Spiders of Burma*, p. 2, 1895, in part.

Resembling *A. fossor*, but much smaller, the head higher and wider, its width equal to length of area between fovea and eyes. *Sternum* as broad as long. First *leg* without spines on inner side of patella and tibia; the inferior tibial spines long, setiform, not stout as in *A. fossor*; protarsus not scopulate to base; tarsus and protarsus of 2nd leg not scopulate. Apical segment of posterior *mamillæ* a little longer than 2nd segment.

Measurements in mm.—Total length 21, carapace 11·5, 1st leg 24, 4th leg 29.

Loc. Tenasserim (*Oates*).

Genus **DAMARCHUS**, Thorell.

Damarchus, *Thorell, Sv. Vet.-Akad. Handl.* xxiv, no. 2, p. 14, 1891; *Simon, Hist. Nat. Araign.* i, p. 107, 1892.

Allied to *Atmetochilus*, but with the posterior sternal sigilla large and about equally distant from each other and from the lateral margin; the remaining sigilla marginal; no central depression in the anterior half of the sternum. Male with anterior tibia tipped with a single short spur armed with a long curved spine. Tarsus of palp short and truncate.

Type, *D. workmanni*, Thorell.

Distribution. Burma, Malacca, Sumatra.

146. **Damarchus oatesii**, *Thorell, Spiders of Burma*, p. 2, 1895.

♀. *Colour*: carapace and legs reddish brown above, paler below; abdomen blackish, ornamented above with oblique rows of pale spots. *Carapace* one-third longer than wide, scarcely longer than protarsus and tarsus of 4th leg, exceeding patella and tibia of 4th or of 1st; *eyes* of anterior line straight, medians large, less than half a diameter apart and less than a diameter from the laterals. Tibiæ of *legs* armed with setiform spines; protarsi with stouter spines.

♂. *Carapace* wider and lower than in ♀; legs longer. Tibial apophysis of 1st leg consisting of a process tipped with a long curved spine. *Palpal organ* with bulb piriform; spine short, slender, filiform, and lightly curved.

Measurements in mm.—♀. Total length 22, carapace 8, 1st leg 18, 4th leg 21. ♂. Total length 15, carapace 7·5, 1st leg 20, 4th leg 26.

Loc. Burma: Rangoon, and Double Island in the Moulmein River (*Oates*).

Family DIPLURIDÆ.

Resembling the Ctenizidæ in having 3 claws, of which the superior are strongly toothed, and in having no ungual tufts * on the tarsi; but distinguished by the absence of the *rastellum*, by having the posterior *spinners* very long and the anterior widely separated, and by the small size and marginal position of the *sternal sigilla*.

Distribution. Tropical and temperate parts of the world to the south of about the 45th parallel of N. lat.

Habits. The species of Dipluridæ live in tubes lined with silk, which is produced beyond the mouth of the tube in the form of an extended sheet of web constituting a snare.

Synopsis of Indian Genera.

a. Terminal segment of posterior mamillæ flexible and as long as the preceding two; labium unarmed .... ISCHNOTHELE, p. 170.

b. Terminal segment of posterior mamillæ shorter than preceding two, straight, not flexible; labium spinulose .... MACROTHELE, p. 171.

Genus **ISCHNOTHELE**, Ausserer.

Ischnothele, *Ausserer, Verh. z.-b. Ges. Wien*, xxv, p. 162, 1875.
Thelechoris, *Karsch, Abh. Ver. Bremen*, vii, p. 196, 1881.
Entomothele, *Simon, Ann. Soc. Ent. Fr.* 1888, p. 235.

Carapace low; fovea deep, procurved; ocular tubercle large; lateral eyes large, elliptical. *Mandible* armed below with two rows of teeth; *maxillæ* studded basally with spicules; *labium* unarmed. *Legs* spined, not scopulate; *tarsi* not spined. *Abdomen* broad, posteriorly truncate: space between anterior mamillæ exceeding their length, and about six times their diameter; posterior mamillæ very long, their distal segment as long as the others, slender and flexible.

♂ with single spur on the tibia of the 1st leg; tarsus of palp slender, as long as the tibia.

Type, *I. caudata*, Auss.

Distribution. Central and South America; Tropical Africa; Madagascar; India.

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* Except in the tropical African genus *Heterothele*.

147. **Ischnothele dumicola**, sp. n.

♀. *Colour*: integument yellowish brown, clouded with black and covered with greyish hairs; sternum dark; abdomen ornamented above on each side with a row of six pale, obliquely set spots or short stripes. *Carapace* as long as patella and tibia of 4th leg, and as patella, tibia, and half the protarsus of 1st leg.

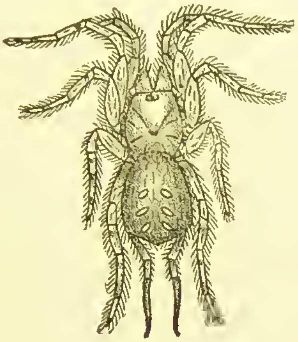

Fig. 55.
Ischnothele dumicola, ♀, × 2.

♂. Smaller than ♀; spur on tibia of 1st leg external, stout, nearly straight, pointed; protarsus arcuate in its basal half. *Palp* with tibia a little inflated; spine of palpal organ stout, straight at base, filiform and curved apically.

Measurements in mm.—♀. Total length 9, carapace 4, 1st leg 8, 4th leg 11. ♂. Total length 6, carapace 3·5, 1st leg 7·5, 4th leg 10·5.

Loc. Western India: Poona (*Wroughton*).

Genus **MACROTHELE**, Ausserer.

Macrothele, *Ausserer*, *Verh. z.-b. Ges. Wien*, xxi, p. 181, 1871; *Simon, Hist. Nat. Araign.* i, p. 184, 1892.

Differs from the preceding genus in having the thoracic fovea straight or recurved, the labium studded with spicules, the tarsi of the legs armed with spines, and the terminal segment of the posterior spinners shorter than the 1st and 2nd taken together, straight, and not flexible and sinuous.

Type, *Macrothele calpetana* (Walck.).

Distribution. Mediterranean Region; Eastern Oriental Region and New Zealand.

148. **Macrothele maculata**, *Thorell, Ann. Mus. Genova*, xxviii, p. 409, 1890 (Diplura); *id. op. cit.* xxxvii, p. 184, 1897 (Macrothele).

♀. *Colour* blackish; abdomen spotted below and banded above as in the foregoing species. *Carapace* as long as patella and tibia of 4th or of 1st leg.

Measurements in mm.—Total length 15, carapace 7·25, 1st leg 21, 4th leg 23.

Loc. Burma: Yado and Plapoo in Tenasserim (*Fea*).

Family BARYCHELIDÆ.

Medium-sized Mygalomorphæ which, except in the aberrant genus *Sason*, resemble the Ctenizidæ in being furnished with a rastellum, but differ from them and from the Dipluridæ in having distinct ungual tufts and only two untoothed or weakly toothed claws on the tarsi. As in the Dipluridæ, the sternal sigilla are small and marginal. The spinning-mamillæ resemble those of the typical Ctenizidæ in forming a compact cluster, the apical segment of the posterior pair being small and shorter than the segments that precede it.

Distribution. S. Europe; Africa; Mauritius; India and Ceylon, thence eastwards as far as Australia and the Fiji Islands; S. America.

Habits. Mostly ground-living burrowing Spiders, which generally, but by no means always, close the burrow with a trap-door.

Synopsis of Indian Genera.

a. Eyes scattered, not aggregated on a tubercle; no rastellum	SASON, p. 172.
b. Eyes aggregated on a tubercle; rastellum always present in the female.	
*a*¹. A single pair of spinners	DIPLOTHELE, p. 174.
*b*¹. Two pairs of spinners.	
*a*². Thoracic fovea lightly recurved	SASONICHUS, p. 177.
*b*². Thoracic fovea lightly or strongly procurved.	
*a*³. Ocular area distinctly wider behind than in front; fovea strongly procurved	PLAGIOBOTHRUS, p. 175.
*b*³. Ocular area as wide in front as behind; fovea lightly procurved.	SIPALOLASMA, p. 176.

Genus SASON, Simon.

Sarpedon, *O. P. Cambr. P. Z. S.* 1883, p. 353 (nom. præocc.).
Sason, *Simon, Bull. Soc. ent. Fr.* 1887, p. cxcv; *id. Hist. Nat. Araign.* i, p. 130, 1892.
Satzicus, *Simon, J. A. S. B.* lvi, pt. 2, p. 286, 1888.
Œcophlœus, *Pocock, A. M. N. H.* (6) ix, p. 49, 1892.

Carapace with fovea recurved or nearly straight; no ocular tubercle; ocular area nearly twice as wide as long; *eyes* of anterior line strongly procurved; anterior laterals not far from edge of carapace, widely separated from posterior laterals. *Mandibles* small, depressed, without rastellum. *Labium* in female quadrate, armed with row of teeth; maxillæ with a few teeth. *Legs* weakly spined, the anterior pairs scopulate.

♂. Tibia of 1st leg with a single spur on inner side; tarsus of palp short.

Type, *S. robustum*, O. P. Cambr.

Distribution. S. India, Ceylon, Andaman Islands; Celebes.

Habits. These Spiders construct on walls and tree-trunks a shallow domicile furnished with two doors opening back to back, and consisting of small coherent particles of leaves or other material.

Synopsis of Indian Species.

Males.

a. Labium armed with a complete row of teeth	*S. armatoris*, p. 174.
b. Labium unarmed.	
a^1. Legs banded	*S. robustum*, p. 173.
b^1. Legs not banded	*S. andamanicum*, p. 174.

Females.

a. Carapace high, as long as patella, tibia, and protarsus of 1st leg	*S. robustum*, p. 173.
b. Carapace low, as long as patella, tibia, and half protarsus of 1st leg	*S. cinctipes*, p. 173.

149. **Sason robustum**, *O. P. Cambr. P. Z. S.* 1883, p. 354, pl. 36, fig. 1 (Sarpedon).

♀. *Colour* yellowish red; carapace varied with black; legs and palpi strongly banded; abdomen blackish above and ornamented with two posteriorly converging rows of pale spots. *Carapace* high, strongly elevated in front of the fovea, which is situated on its posterior slope; lightly convex or sloped downwards anteriorly; as long as patella, tibia, and protarsus of 1st leg, and as patella and tibia or tibia and protarsus of 4th.

♂. Differing from ♀ (according to Simon) in having the labium and maxillæ unarmed. Tibial spur of anterior leg curved and spiniform.

Measurements in mm.—♀. Total length 10, carapace 5, 1st, 2nd, and 3rd legs 9, 4th 12·5.

Loc. Ceylon: Punduloya (*Green*).

150. **Sason cinctipes**, *Pocock, A. M. N. H.* (6) ix, p. 49, pl. iii A, fig. 1, 1892 (Œcophlœus).

Like the preceding species, but with the *carapace* much lower, being scarcely elevated posteriorly in front of the fovea, so that the latter is situated almost on a level with the upper surface of the carapace, the area between the fovea and the eye being almost horizontal. *Legs* longer; carapace as long as patella, tibia, and half the protarsus of the 1st, distinctly less than patella and tibia or than tibia and protarsus of 4th.

Measurements in mm.—Total length 15·5, carapace 6, 1st leg 14, 4th 17·5.

Fig. 56.—*Sason cinctipes*, ♀, × 1½.

Loc. Ceylon: Punduloya (*Green*); Kanthalai (*Yerbury*); also young specimens of this or of a nearly allied species from the Madras Presidency (*Jambunathan*).

151. **Sason armatoris**, sp. n.

Like the preceding in colour, and differing from the male of *S. robustum* in having a complete row of teeth on the labium. *Carapace* nearly flat above, shorter than patella and tibia of all the legs, about as long as tibia of 4th; fovea scarcely recurved; space between lateral eyes equalling diameter of anterior lateral. Tibial spur of 1st *leg* conical, tipped with a long curved spine. Spine of *palpal organ* straight pointed, rising at the extremity of the bulb.

Measurements in mm.—Total length 10, carapace 5, 1st leg 16, 4th leg 20.

Loc. Travancore: Trivandrum and Ponmudi (*Ferguson*).

152. **Sason andamanicum**, *Simon, J. A. S. B.* lvi, pt. 2, p. 286, 1888 (Satzicus); *id. Hist. Nat. Araign.* i, p. 130, 1892 (Sason).

♂. *Colour* apparently as in the preceding species, but the legs darker towards the extremities, not annulate. *Carapace* with fovea strongly recurved; ocular area about one-third wider than long. *Labium* and *maxillæ* unarmed.

Measurements in mm.—Carapace 5, 1st leg 15·7, 4th 17·3.

Loc. Andaman Islands: Port Blair (*Oldham*).

Genus **DIPLOTHELE**, O. P. Cambr.

Diplothele, *O. P. Cambr. P. Z. S.* 1890, p. 621; *Simon, Hist. Nat. Araign.* i, p. 122, 1892.

♀. *Carapace* with head convex; fovea procurved; ocular area a little longer than wide, parallel-sided; anterior lateral eyes on

the frontal margin, oval, separated by a space which is a little less than their diameter: median eyes close together. *Mandibles* with rastellum consisting of long, hooked, irregularly arranged teeth. *Labium* wider than long, unarmed; maxillæ with a few basal spinules. *Legs* strong and short, anterior pair unarmed, with scopulate tarsi and protarsi; posterior pairs with subsetiform spines, scarcely scopulate. *Anterior spinners* absent.

♂. Ocular area wider behind; mandibles small, subvertical; without rastellum; all the legs with many spines; tibia of anterior leg incrassate, furnished with a very short spine-tipped spur; tarsus of palp long, attenuate, apically obtuse.

Type, *D. walshi*, O. P. Cambr.

Distribution. India and Ceylon.

Synopsis of Species.

a. Protarsi of anterior legs longer than tarsi ...... *D. walshi*, p. 175.
b. Protarsi of anterior legs not longer than tarsi .... *D. halyi*, p. 175.

153. **Diplothele walshi**, *O. P. Cambr. P. Z. S.* 1890, p. 621, pl. xliii, fig. 1.

Colour: carapace pale yellow-brown, with darker radiating lines; legs, palpi, sternum, and mouth-parts yellowish; abdomen of dull clay-yellow colour, marked on the upper side with broken transverse black bands of varied width and clearness of definition, those on the anterior half being the strongest and best defined. *Legs* with protarsi longer than tarsi; tarsi of anterior pairs and of palpus furnished above with a few clavate bristles.

Length 8·5 mm.

Loc. Bengal: Orissa (*Walsh.*).

154. **Diplothele halyi**, *Simon, Hist. Nat. Araign.* i, p. 123, 1892.

♀. Differing (according to Simon) from the female of *D. walshi* in having the abdominal pattern less distinct, the fovea larger, and the protarsi of the anterior legs not longer than the tarsi.

♂. More thickly hairy than the female. *Carapace* lower. *Legs* longer; tibial spur of 1st tipped with a slender curved and slightly elevated spine; protarsus with a single spine below; protarsus of 2nd with two spines. *Palpi* strong, unarmed; spine of organ straight, but with apex twisted and acutely bifid.

Total length of ♀ 10 mm.; ♂, 9 mm.

Loc. Ceylon: Nuwara Eliya (*Simon*).

Genus **PLAGIOBOTHRUS**, Karsch.

Plagiobothrus, *Karsch, Berl. ent. Zeits.* xxxvi, p. 272, 1892.

Carapace with head high, fovea procurved; ocular area about one-third wider than long, narrowed in front; *eyes* of anterior line strongly procurved, posterior ends of laterals in advance of anterior edge of medians, space between the two anterior laterals

almost twice the long diameter of the eye. *Rastellum* consisting of cluster of strong spines. *Labium* and maxillæ toothed; *legs* and palpi scantily scopulate, spined; claws toothed. *Mamillæ* normal.

Type, *P. semilunaris*, Karsch.

Distribution. Ceylon.

155. **Plagiobothrus semilunaris**, *Karsch, Berl. ent. Zeits.* xxxvi, p. 273, t. x, fig. 3, 1892.

Colour: carapace and limbs deep brown, ocular tubercle yellow; abdomen black above, brown beneath, with epigastric area and opercula pale. *Carapace* nearly one fourth louger than wide, as long as patella and tibia, and one third of the protarsus of 1st leg, a little longer than patella and tibia of 4th. Tibia of *palpus* armed with 1 basal inferior and about 4 apical spines; 1st leg unarmed; 2nd with 2 spines on inner and 2 on underside of tibia and protarsus; tibia and protarsus of 3rd and 4th with many spines.

Measurements in mm.—Total length 24, carapace 11, 1st leg 26, 2nd leg 23, 3rd leg 21·5, 4th leg 30·5.

Loc. Ceylon: Peradeniya (*Sarasin*); Kandy (*Yerbury*).

Genus **SIPALOLASMA**, Simon.

Sipalolasma, *Simon, Hist. Nat. Araign.* i. p. 123, 1892.

Differs from *Plagiobothrus* in having the thoracic fovea transverse, with only a slight procurvature, the ocular area not or scarcely wider behind than in front, and the protarsi and tarsi of the anterior two pairs of legs thickly scopulate to the base, that of the tarsus of the 2nd leg being at most narrowly divided.

♂ with legs much longer and thinner; tibia of 1st pair with a low spine-tipped spur; tarsus of palp short, bifid.

Type, *S. ellioti*, Simon.

Distribution. Ceylon.

Synopsis of Species (*females*).

a. Length 11 mm.; claws unarmed .... *S. ellioti*, p. 176.
b. Length 22 mm.; claws toothed .... *S. greeni*, p. 177.

156. **Sipalolasma greeni**, sp. n.

♀. *Colour*: carapace and legs deep brown, femora clearer red, coxæ and sternum darker than femora; abdomen blackish. *Carapace* a little longer than broad, its length equal to patella and tibia of 4th leg. *Labium* with 3 teeth; tibia of *palp* and tibia and protarsus of 3rd and 4th *legs* armed with many spines, tibia of 1st with about 8, of 2nd with about 5 spines; scopulæ of 1st and 2nd legs forming a thick fringe; tarsal scopula of 2nd narrowly divided, of 3rd and 4th broadly divided; claws toothed.

Measurements in mm.—Total length 22, carapace 10, 1st leg 23, 4th 27.

Loc. Ceylon: Punduloya (*Green*).

157. **Sipalolasma ellioti**, *Simon, Hist. Nat. Araign.* i, p. 124, fig. 114, 1892.

♀. Smaller than the preceding; the sternum, mouth-parts, palpi, and legs uniformly coloured. *Labium* with 6–7 teeth. *Tarsi* of both 1st and 2nd legs undivided; *claws* of legs unarmed.

♂. Carapace and legs covered with long yellowish pubescence. *Mandibles* much smaller than in female. Tibia of 1st *leg* armed with spines, and at the apex on the inner side with a robust and curved tooth, and beneath with a medium-sized blunt spur tipped with four teeth (spines). Tibia of *palp* armed on the inner side and at apex with five spines; tarsus small, deeply bifid at apex; spine of palpal organ longer than bulb, with the apex slender and lightly curved.

Length of ♀ 11 mm., of ♂ 10.

Loc. Ceylon: Cottawa (*Simon*).

Genus **SASONICHUS**, gen. nov.

Allied to *Plagiobothrus* and *Sipalolasma*; but with the thoracic fovea recurved. Tibia of 1st leg in male without apical spur; tarsus of palp much longer than wide, with a large rounded internal lobe. Tarsal scopulæ scanty; protarsal scopulæ present only at apex of 1st and 2nd legs.

Type, *S. sullivani*, sp. n.

Distribution. Southern India.

158. **Sasonichus sullivani**, sp. n.

Colour a uniform ashy black, with tarsi reddish yellow. *Carapace* low, about as long as patella and tibia, and a little longer than protarsus and tarsus of 1st leg, as long as protarsus of 4th. *Palp* with tibia armed with 5 spines; bulb of palpal organ subspherical, deeply grooved, spine slender, lightly sinuous. *Legs* bristly; tibia of 1st cylindrical, armed with 8 spines, the one at the apex on the inner side long and curved; the rest of the legs strongly spined.

Measurements in mm.—Total length 12, carapace 6, 1st leg 15·5, 4th leg 21.

Loc. Travancore: Trivandrum (*Sullivan*).

Family THERAPHOSIDÆ.

Medium-sized or very large Mygalomorphæ, differing from the Barychelidæ in having the apical segment of the posterior spinners cylindrical and at least as long as the 2nd segment, and in the absence of the rastellum. Eyes always aggregated on a distinct tubercle.

Distribution. Temperate and tropical countries to the south of the 45th parallel of north latitude, but apparently absent from New Zealand.

Habits. Most of the species are fossorial, but they never close the aperture of the burrow with a movable lid. Other species are met with under stones, in hollow trees, or sheltering in any natural crevice.

The Indian genera of this family are referable to the following four subfamilies :—

a. No stridulating organ between the outer surface of the mandible and the inner surface of the coxa of the palp .... *Theraphosinæ*, [p. 178.
b. A stridulating organ between the mandible and coxa of palp.
  a[1]. Outer surface of mandible covered with scopula or pad of feathery hairs ...... *Ornithoctoninæ*, [p. 203.
  b[1]. No scopula of feathery hairs on outer side of mandible.
    a[2]. Inner surface of coxa of palp (maxilla) furnished with simple scattered needle-like bristles .... *Thrigmopœinæ*, [p. 184.
    b[2]. Inner surface of maxilla furnished with cluster or series of claviform or bacilliform bristles .... *Selenocosmiinæ*. [p. 187.

Subfamily THERAPHOSINÆ.

No stridulating-organ between the outer surface of the mandible and the adjacent surface of the coxa of the palp, these two surfaces being smooth and at most scantily hairy. There is also no stridulating-organ between the basal segments of the palp and 1st leg, such as is found in the tropical African genera constituting the subfamily *Eumenophorinæ*.

Distribution. Mediterranean area of Palæarctic region ; tropical West Africa ; India and Burma ; America from the Southern States of the Union to Patagonia.

Synopsis of Indian Genera.

a. Thoracic fovea straight, transverse, at most slightly procurved.
  a[1]. Anterior leg of male with strong tibial spur. PLESIOPHRICTUS, [p. 181.
  b[1]. Anterior leg of male without tibial spur .. ISCHNOCOLUS, [p. 183.

b. Thoracic fovea with distinct crescentic procurvature.
  a². Fovea shallow, sublinear; posterior sigilla wide apart and small .... HETEROPHRICTUS, [p. 180.
  b². Fovea very strong and strongly curved; posterior sigilla large, submedian .... PHLOGIODES, p. 179.

Genus PHLOGIODES, Pocock.

Phlogiodes, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 748, 1899.

Thoracic fovea deep, strongly procurved. *Eyes* of anterior line slightly procurved. *Legs* strong, weakly spined, strongly scopulate, at least in male; claws unarmed. *Sternum* with posterior sigilla very large and remote from the margin. First leg without tibial spur in male.

Type, *P. validus*, Pocock.

Distribution. Western India.

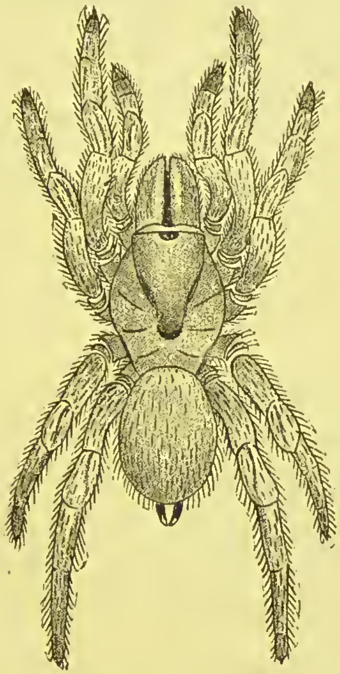

Fig. 57.—*Phlogiodes robustus*, ♀. ×½.

Synopsis of Species.

a. Femora of legs reddish, the rest of the segments greyish white (♂) .... *P. validus*, p. 179.
b. Legs uniformly coloured (♀) .... *P. robustus*, p. 180.

159. **Phlogiodes validus**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 748, 1899.

♂. *Colour*: carapace with coating of silky yellow hair, femora of legs with golden brown hairs, the rest of the segments with

N 2

greyish-white hairs; abdomen covered above with long golden brown hairs. *Carapace* a little longer than broad, low and narrow in the head-region, shorter than patella and tibia of 1st and 4th legs. *Legs* long and strong; protarsus of 1st scopulate to base, of 2nd almost to base, of 3rd only at apex; tarsal scopula of 4th divided; protarsus of 1st with one inferior apical spine, of 2nd, 3rd, and 4th with many apical spines; two pairs of superior spines on 3rd protarsus, one pair of anterior spines on 4th protarsus. *Palpus* unspined; bulb of organ but little inflated; spine triangular, broad and subspatulate at base, pointed distally.

Measurements in mm.—Total length 25, carapace 12·2, 1st leg 41, 4th 46.

Loc. Matheran (*Phipson*).

160. **Phlogiodes robustus**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 748, 1899.

♀. *Colour*: carapace and limbs reddish brown; abdomen blackish above; hairy clothing greyish red. *Carapace* long; head high, much longer than patella and tibia of 1st and of 4th leg. *Legs* short, very strong, spined as in *P. validus*, the anterior thicker than the posterior; patella of 1st as long as tibia, tarsus almost as long as protarsus; protarsus of 1st with entire scopula, of 2nd scopulate at sides, of 3rd and 4th not scopulate; tarsal scopula of 1st entire, of 2nd basally divided, of 3rd and 4th present only at tip and sides of the segments.

Measurements in mm.—Total length 27, carapace 13, 1st leg 29, 4th 33.

Loc. Matheran (*Phipson*); Jauli in Satara (*Master*).

Genus **HETEROPHRICTUS**, nov.

Carapace with head narrow; fovea small, procurved; eyes of anterior line slightly procurved. *Legs* slender, spined; protarsi of 1st and 2nd scopulate only in the distal half, of 3rd and 4th scopulate at apex; tarsal scopulæ of all legs divided: claws unarmed. *Sternum* with posterior sigilla deep, separated from the margin by a space equal to their own length and from each other by about three times that distance.

Type, *H. milleti*, sp. n.

Distribution. Western India.

161. **Heterophrictus milleti**, sp. n.

Colour: integument reddish brown, covered with rusty-red hairs; some white hairs at extremity of 1st leg. *Carapace* with head elevated, as long as patella and tibia of 4th leg, a little longer than those of 1st. *Legs* of 1st and 2nd pairs with a few spines on tibiæ and protarsi, of 3rd and 4th pairs with many spines on these segments; protarsus of 1st short, barely as long as patella. *Abdomen* long, parallel-sided, subtruncate posteriorly.

Measurements in mm.—Total length 29, carapace 13, 1st leg 30, 4th leg 36.

Loc. Násik (*Millet*); also immature specimens of a nearly allied form from Eastern Poona (*Irani*) and Jauli in Satara (*Master*).

Genus **PLESIOPHRICTUS**, Pocock.

Plesiophrictus, *Pocock, Journ. Bom. N. H. Soc.* xii, p. 749, 1899.

Thoracic fovea straight, transverse; *eyes* of anterior line slightly procurved. *Labium* and *maxillæ* spinulose. *Sternum* with marginal sigilla. *Legs* spined; a few spines only on the anterior tibiæ and protarsi, many more upon these segments of the 3rd and 4th legs; tarsal scopulæ of 1st and 2nd entire or scarcely divided, of 3rd and 4th divided by band of setæ.

Tibia of anterior leg in male with a strong spur.

Type, *P. millardi*, Pocock.

Distribution. South and West India; Ceylon.

Synopsis of Species.

a. Protarsus of 1st leg covered above with white hair; rest of the body and limbs brown .... *P. millardi*, p. 181.
b. Protarsus of 1st leg brown or blackish like rest of limbs.
  a[1]. Anterior lateral eyes not larger than medians; anterior leg shorter than posterior.
    a[2]. 3rd leg less than twice as long as carapace.
      a[3]. Posterior ends of anterior eyes in a straight line .... *P. sericeus*, p. 182.
      b[3]. Posterior ends of anterior lateral eyes on a level with centres of medians .. *P. collinus*, p. 182.
    b[2]. 3rd leg more than twice as long as carapace.......................... *P. fabrei*, p. 182.
  b[1]. Anterior lateral eyes much larger than medians; anterior leg not shorter than posterior .... *P. tenuipes*, p. 182.

162. **Plesiophrictus millardi**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 749, 1899.

♂. *Colour* a uniform mouse-brown, except that the upper side of the protarsus of the 1st leg is white. *Carapace* as long as patella and tibia of 1st and 4th legs. *Legs* with protarsal scopulæ scanty on anterior, absent on posterior pairs; tibia of 1st slightly incrassate; spur slightly curved, directed forwards, a tuberculiform spur accompanied by a long black spine above it on the inner side; many spinules between the two. *Palp.* unspined; spine of palpal organ broad at base, filiform, and spirally twisted distally.

Measurements in mm.—Total length 12, carapace 6, 1st leg 15, 4th leg 16.

Loc. Bombay: Matheran (*Millard*), Uran (*Aitken*).

163. **Plesiophrictus sericeus**, sp. n.

♀. *Colour*: integument blackish brown; hairs yellowish brown, long on the lower side of the femora and patellæ. *Carapace* as long as patella, tibia, and one-third of protarsus of 1st and 4th legs; *eyes* of anterior line nearly straight, the posterior rim of the eyes almost on a level; the laterals on each side scarcely separated. *Mandible* armed below with a row of 11–13 larger teeth and several smaller teeth posteriorly. Tibiæ of 1st and 2nd *legs* unspined; protarsus with one inferior spine; tibiæ and protarsi of 3rd and 4th legs with many spines.

Measurements in mm.—Total length 22, carapace 10, 1st leg 23, 4th leg 26.

Loc. Eastern part of Poona district (*Irani*).

164. **Plesiophrictus collinus**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 749, 1899.

Allied to *P. sericeus* but smaller, and with the lateral eyes of the anterior row set more forwards, so that their posterior ends are in a line with the centres of the medians; the two laterals separated by a space which is about equal to half the diameter of the anterior lateral. *Mandible* armed below with a single row of 8–9 teeth, without posterior supplementary teeth. *Legs* a little shorter as compared with carapace than in *P. sericeus*; the carapace being equal to the tibia + protarsus of the 4th leg.

Measurements in mm.—Total length 18, carapace 8·5, 1st leg 19, 4th 20.

Loc. Yercaud in the Shevaroy Hills (*Henderson*); Madras Presidency (*Jambunathan*).

165. **Plesiophrictus tenuipes**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 749, 1899.

Differing from *P. collinus* and *P. sericeus* in having the anterior lateral eye much larger than the median, and distinctly elliptical instead of subspherical, its posterior edge almost on a level with that of the median, its anterior edge far in advance of that of the median. *Mandible* armed below as in *P. collinus*. *Legs* much longer; carapace as long as patella and tibia of 1st or 4th; anterior legs not stouter than posterior; all the tarsal scopulæ divided.

Measurements in mm.—Total length 16, carapace 7, 1st leg 16, 4th leg 20.

Loc. Ceylon: Kandy (*Yerbury*).

The following species is probably referable to *Plesiophrictus* rather than to *Stichoplastus*, a typically Neotropical genus.

166. **Plesiophrictus fabrei**, *Simon, Ann. Soc. Ent. Fr.* lxi, p. 278, 1892 (Stichoplastus).

♀. *Colour* much as in the preceding species. *Carapace* as long as

patella and tibia of 4th leg, fovea lightly procurved; eyes of anterior line subequal. *Legs* longer than in the preceding species (*cf.* measurements); tarsal scopulæ of 3rd and 4th divided.

Measurements in mm.—Total length 10·2, 1st leg 26·2, 4th 29·5.

Loc. S. India: Madura (*Fabre*).

Genus ISCHNOCOLUS, Ausserer.

Ischnocolus, *Ausserer, Verh. z.-b. Ges. Wien,* xxi, p. 184, 1871; *Simon, Hist. Nat. Araign.* i, p. 135, 1892.

Carapace low; fovea straight, slightly curved; eyes of anterior line subequal, slightly procurved. *Legs*, in the typical form, spiny, especially on the tibiæ and protarsi of the 2nd and 3rd pairs; tarsal scopulæ of all the legs divided by a band of setæ in the adult. No tibial spurs on anterior leg of male. In the typical form the tarsus of the palp is long and subcylindrical, and overlaps the palpal organ.

Type, *I. holosericeus*, Auss. S. Europe.

Distribution. Mediterranean district of Palæarctic Region, and possibly the Oriental Region.

The Indian species here referred to this genus may be diagnosed as follows *:—

a. Legs without spines .... *I. brevipes*, p. 183.
b. Legs, especially on tibiæ and protarsi of 3rd and 4th pairs, with many spines.
  *a*¹. Abdomen ornamented above with oblique pale spots .... *I. ornatus*, p. 184.
  *b*¹. Abdomen not spotted above .... *I. linteatus*, p. 183.

167. **Ischnocolus linteatus**, *Simon, Ann. Soc. Ent. Fr.* lx, p. 308 1891.

♀. *Colour*: integument blackish, hairy clothing yellowish. *Carapace* with fovea small and transverse; eyes of anterior line subequal, the medians scarcely larger than the laterals. *Labium* not much wider than long; the spinules arranged in three transverse series. Anterior *legs* with protarsi scarcely longer than the tarsi, armed with a single apical spine below; tibiæ unarmed; posterior legs strongly spined.

Measurements in mm.—Total length 13, carapace 6, width of carapace 4·5.

Loc. S. India: Pondicherry.

This species probably belongs to the genus *Plesiophrictus.*

168. **Ischnocolus brevipes**, *Thorell, Ann. Mus. Genova,* xxxvii, p. 170, 1897.

♀. *Colour* of integument blackish, of hairy coating pale ferruginous. *Carapace* low; fovea slightly procurved, scarcely longer than patella and tibia of 1st, distinctly longer than those of

* It is doubtful if any of these species really belong to *Ischnocolus*.

4th leg. *Legs* short, without spines, except two at the tip of each of the posterior protarsi below.

♂. *Carapace* a little shorter than patella and tibia of 1st, a little longer than those of 4th leg. *Palpal organ* with spine very long and almost semicircularly curved.

Measurements in mm.—♀. Total length 18·5, carapace 7, 1st leg and 4th leg 18. ♂. Total length 15, carapace 7, 1st leg 21·5, 4th 19.

Loc. Burma: Mooleyit in Tenasserim and Yadò in Karennee (*Fea*).

169. **Ischnocolus ornatus**, *Thorell, Ann. Mus. Genova,* xxxvii p. 173, 1897.

♀. *Colour* much as in the preceding species, but the abdomen ornamented above with small, sub-oblique pale spots, arranged in two longitudinal rows. *Carapace* with straight thoracic fovea, longer than patella aud tibia of 1st and of 4th legs. Patella and tibia of 1st *leg* a little longer than those of 4th; anterior legs with a single inferior apical protarsal spine; tibiæ and protarsi of 3rd aud 4th legs spined.

Measurements in mm.—Total length 12, carapace 6, 1st leg 14, 4th 15·5.

Loc. Burma: Prome (*Fea*).

Subfamily THRIGMOPŒINÆ, nov.

A stridulating-organ present between the mandible and the basal segment of the palp (maxilla). On the mandible some of the hairs which form the posterior portion of the oral fringe are

Fig. 58.—External surface of mandible of *Thrigmopœus insignis*. *a*. Cluster of bristles.

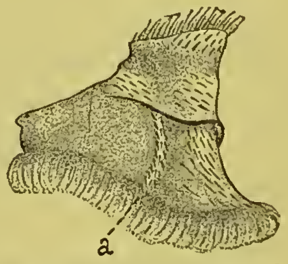

Fig. 59.—Inner surface of maxilla of *Thrigmopœus insignis*. *a*. Crest bearing spinules.

modified to form a small cluster of vibratile bristles (fig. 58, *a*), and on the adjacent surface of the maxilla there are regularly or irregularly arranged stiff aciculate bristles (fig. 59, *a*) which scrape against those on the mandible when the maxilla is moved up and down.

Distribution. S. India.

Synopsis of Indian Genera.

a. Stridulating bristles on maxilla irregularly scattered .... HAPLOCLASTUS, p. 185.
b. Stridulating bristles on maxilla arranged in a definite curved series .... THRIGMOPŒUS, p. 186.

Genus HAPLOCLASTUS, Simon.

Haploclastus, *Simon, Hist. Nat. Araign.* i, p. 152, 1892; *Pocock, A. M. N. H.* (6) xv, p. 169, 1895.

Carapace low; fovea straight; ocular tubercle wider than long; eyes of anterior line subequal, a little procurved. *Mandible* furnished below externally with a few irregularly arranged, long, stout, but apically filiform bristles mixed up with the hairs of the oral fringe. *Maxilla* furnished on its inner side with scattered, irregularly arranged, longer and shorter spines and spiniform bristles. *Legs* without spines; protarsus of 1st and 2nd scopulate to the base, of 3rd scopulate in its distal half, of 4th scopulate apically, the scopula divided; tarsal scopulæ entire, except that of 4th leg which is divided in its basal half.

Type, *H. cervinus*, Simon.

Distribution. S. India.

Synopsis of Species.

a. 4th leg as long as 1st and longer than 2nd .... *H. cervinus*, p. 185.
b. 4th leg shorter than 1st and 2nd .... *H. nilgirinus*, p. 185

170. **Haploclastus nilgirinus**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 747, 1899.

Colour: carapace black, clothed like the limbs and abdomen with brownish-yellow hairs; sternum, coxæ, and lower side of femora at least of 1st and 2nd legs velvety black. *Carapace* about one-fourth longer than wide, moderately high and convex; fovea large, slightly procurved; length of carapace almost equal to patella and tibia of 1st leg, slightly greater than those of 2nd and of 4th, longer also than protarsus and tarsus of 4th. Patella and tibia of 2nd *leg* slightly longer than of 4th.

Measurements in mm.—Total length 52, carapace 24, length of 1st leg 64, 2nd 60, 3rd 48, 4th 58.

Loc. Nilgiri Hills (*Daly*).

171. **Haploclastus cervinus**, *Simon, Hist. Nat. Araign.* i, p. 152, 1892.

Colour: integument blackish, hairs ferruginous. *Carapace* low. *Legs* moderately long, the 1st pair scarcely longer than the 4th.

Measurements in mm.—Total length about 30, length of carapace 15, width 11; length of 1st leg 39, 2nd 27, 3rd 31·2, 4th 38·8.

Loc. Palni Hills in S. India.

This species is probably based upon a young specimen.

Genus THRIGMOPŒUS, Pocock.

Thrigmopœus, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 747, 1899.

Closely allied to *Haploclastus*, but with the *stridulating area* on mandible consisting of a large semicircular cluster of many curved, thickened, but pointed bristles; on the maxilla the aciculate bristles above the suture are arranged without definite order, but below the suture there is a definite curved vertical row of these bristles near the middle of the segment, the area behind this row being smooth and in front of it furnished with many bristles arranged without order. Protarsi of 3rd and 4th *legs* armed apically with marginal spines both above and below.

Type, *T. insignis*, Pocock.

Distribution. Western India.

Synopsis of Species.

a. Fovea as wide as ocular tubercle; carapace longer than patella and tibia of 2nd leg, equal to those of 4th .... *T. insignis*, p. 186.

b. Fovea less than width of tubercle; carapace shorter than patella and tibia of 2nd leg and than those of 4th .... *T. truculentus*, p. 186.

172. Thrigmopœus insignis, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 747, 1899.

♀. *Colour*: integument blackish, hairs on carapace yellowish brown, darker on upper side of legs; velvety black on sternum, coxæ, and lower side of femora and abdomen. *Carapace* nearly one-third longer than broad, moderately high; fovea as wide as ocular tubercle, lightly procurved; length of carapace equal to that of patella and tibia of 4th leg, slightly shorter than those of 1st, a little longer than patella and tibia of 2nd and than protarsus and tarsus of 4th. First *leg* less than three times the length of the carapace, 3rd a little more than twice the length; patella and tibia of 3rd as long as width of carapace.

Measurements in mm.—Total length 55, length of carapace 27; length of 1st leg 76, of 2nd 68, of 3rd 56, of 4th 73.

Loc. Kanara Ghats (*Bell*).

173. Thrigmopœus truculentus, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 748, 1899.

Smaller and paler in *colour* than the preceding species; *carapace* lower; fovea less than width of ocular tubercle; length of carapace less than that of patella and tibia and than protarsus and tarsus of 4th leg, less also than patella and tibia of 2nd and than protarsus and tarsus of 4th. *Legs* longer, 1st leg nearly three and a half times as long as carapace.

Measurements in mm.—Total length 40, length of carapace 19; length of 1st leg 65, 2nd 57, 3rd 44, 4th 62.

Loc. India: Karwar (*Bombay N. H. Soc.*).

Subfamily SELENOCOSMIINÆ.

A stridulating organ present between the mandible and maxilla, and consisting of a row or cluster of vibratile bacilliform bristles on the maxilla (fig. 61) and of spines or spiniform bristles upon

Fig. 60.—Outer surface of mandible of *Chilobrachys masoni*. *a*, stridulating spikes.

Fig. 61.—Inner surface of maxilla of *Chilobrachys masoni*, showing series of bacilliform spines.

the lower portion of the outer surface of the mandible (fig. 60, *a*). *Legs* without spines or with a few only at the extremity of the protarsi. Tibia of anterior leg in male not spurred. Posterior sternal sigilla remote from the margin.

Distribution. Ranging from India and Ceylon to Australia.

Synopsis of Indian Genera.

a. Legs of 4th pair much thicker than those of 1st, with the protarsal scopula entire and extending to base of segment ...... LYROGNATHUS, p. 202.

b. Legs of 4th pair weaker than those of 1st pair, with the protarsal scopula divided and apical.

- a^1. Thoracic fovea transversely linear; one or more tubercles intermixed with the bacilliform bristles on maxilla ...... PŒCILOTHERIA, p. 188.
- b^1. Thoracic fovea crescentically procurved; no tubercles amongst bacilli on maxilla.
  - a^2. Stridulating organ consisting of short spines on mandible and of a single or double row of bacilli overlapped by a fringe of hairs on maxilla ...... CHILOBRACHYS, p. 192.
  - b^2. Stridulating organ consisting of spiniform setæ on mandible and of an oval cluster of bacilli without fringe of hairs on maxilla.
    - a^3. Tarsal scopulæ of 1st, 2nd, and 3rd legs undivided; no inferior claw . SELENOCOSMIA, p. 200.
    - b^3. Tarsal scopulæ of all legs divided; inferior claw retained on posterior leg .... PHLOGIELLUS, p. 202.

Genus PŒCILOTHERIA, Simon.

Pœcilotheria, *Simon, Bull. Soc. Zool. France*, x, p. 38, 1885; *Pocock, A. M. N. H.* (6) xv, p. 170, 1895.

Scurria, *C. Koch, Uebersicht Arachn.* v, p. 74, 1850 (nom. præocc.).

Very large, variegated Spiders with the *carapace* flattish; fovea small, straight; ocular tubercle low; ocular area more than twice as long as wide; *eyes* of anterior line nearly equidistant, procurved, centres of the laterals slightly in front of the anterior edge of the medians. *Mandible* furnished externally in its lower half with many short spines. *Maxilla* with its bacilliform spines few in number, arranged in a single row, and accompanied by one or more black tooth-like tubercles; between the row of bacilli and the suture there is a thick fringe of hairs. *Legs* without spines; scopulæ of the anterior pairs very thick. *Palpal organ* of ♂ piriform, the spine thick, short, and strongly and spirally crested.

Type, *P. fasciata*, Latr.

Distribution. India and Ceylon.

Habits. Live in trees or in the thatch of houses.

Synopsis of Species.

a. Femora of legs black below, or marked with a single basal or apical pale patch.
- a^1. Femora of 1st and 2nd legs with a large yellow patch at base . . . . *P. rufilata*, p. 189.
- b^1. No pale patch at base of femora.
  - a^2. Appendages not conspicuously banded above, dark below, with yellow basal patch on tibiæ. . . . . *P. metallica*, p. 189.
  - b^2. Appendages strongly banded above, femora and tibiæ pale at apex above and tibiæ pale at base below.
    - a^3. Palp black below; patellæ of legs white above and below . . . . *P. miranda*, p. 190.
    - b^3. Palp with yellow patch at apex of femur, base of patella, and base and apex of tibia beneath; patellæ of legs black in basal half . . . . *P. subfusca*, p. 190.

b. Femora of legs whitish or sulphur-yellow below and inside, those of 1st and 2nd legs with black stripe in distal half.
- a^4. Lower side of abdomen with large transverse reddish band behind epigastric fold. *P. regalis*, p. 190.
- a^4. No pale band on lower side of abdomen.
  - a^5. Tibia of palp blackish beneath; 1st leg less than twice as long as carapace, which equals its patella and tibia. *P. formosa*, p. 191.
  - b^5. Tibia of palp pale beneath; 1st leg more than three times as long as carapace, which is less than its patella and tibia.
    - a^6. Ground-colour of anterior legs whitish, femora of 3rd and 4th uniformly greyish brown, not banded . . . . *P. vittata*, p. 192.

b^6. Ground-colour of anterior legs sulphur-yellow ; femora of 3rd and 4th bluish grey.
- a^7. Anterior femora without distinct basal black patch beneath ; the distal black stripe nearly as wide as the yellow basal area........ *P. striata*, p. 191.
- b^7. Anterior femora with distinct basal black patch ; distal black stripe much narrower than yellow basal area.
  - a^8. Black bands on femora very narrow, often absent on femur of 4th leg .... *P. fasciata*, p. 192.
  - b^8. Black bands on femora broad, very broad on femur of 3rd and 4th legs .... *P. ornata*, p. 192.

174. **Pœcilotheria rufilata**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 746, 1899.

♂. *Colour* a tolerably uniform greyish red above, only obscurely mottled ; lower side of abdomen, sternum, coxæ, and trochanters velvety black ; femur of palp metallic black, with paler distal end ; patella and tibia yellowish grey, furnished with long red bristles beneath ; 1st and 2nd legs with femora and tibiæ black with metallic reflections below, but ornamented at the base in front with a large yellow patch, patellæ yellowish brown ; 3rd and 4th legs a tolerably uniform yellowish brown, clothed like the anterior legs with long greyish or reddish bristles. 1st and 4th *legs* subequal in length and about four times the length of the carapace. Spine of palpal organ very strongly carinate.

♀. 1st leg much longer than 4th and a little more than three times as long as carapace, which slightly exceeds the patella and tibia of the 4th.

Measurements in mm.—♀. Total length 60, carapace 30, 1st leg 92, 4th leg 81.

♂. Total length 32, carapace 17, 1st leg 70, 4th 70.

Loc. Trivandrum in Travancore (*Ferguson*).

175. **Pœcilotheria metallica**, *Pocock, A. M. N. H.* (7) iii, p. 93, pl. vii, fig. 3, 1899.

♀. *Colour* of upper side of body much as in *P. subfusca* (p. 190), but the central pale area on the carapace broader, pale band on abdomen less clearly defined ; upper side of legs and palpi not transversely banded ; under side of limbs entirely dark brown, with metallic blue reflections on the anterior pair, and an orange-yellow spot on the base of the tibiæ of the legs. 1st and 4th *legs* about twice and a fourth as long as carapace, which is a little longer than patella and tibia of 2nd and of 4th legs.

Measurements in mm.—Total length 52, carapace 23·5, 1st leg 65, 2nd 59, 3rd 52, 4th 64.

Loc. S. India : Gooty (*Carter*).

176. **Pœcilotheria miranda**, sp. n.

♀. *Colour*: carapace greyish, with a pair of ill-defined brownish bands on each side of the middle line; the pale abdominal stripe broken up by a row of four large brown spots; legs variegated above, patellæ entirely white above and below except for a small dark spot on those of the 3rd and 4th legs; femora entirely velvety black below; tibiæ white with median black stripe; protarsi dark below, with pale basal patch; palpi uniformly dark below. First *leg* about three times, 4th about two and three quarter times as long as carapace, which is as long as patella and tibia of 2nd or of 4th leg. Femora of palp and anterior legs fringed.

Measurements in mm.—Total length 46, carapace 22, 1st leg 64, 2nd 58, 3rd 51, 4th 62.

Loc. Bengal: Chota Nagpur (*Logsdail*).

177. **Pœcilotheria subfusca**, *Pocock, A. M. N. H.* (6) xv, p. 171, 1895; *id. op. cit.* (7) iii, p. 88, 1899.

♀. *Colour*: carapace brown, paler laterally, with narrow white lines radiating from the fovea; pale abdominal band broken up partially or completely into two rows of spots; legs coloured above much as in *P. miranda*, but patellæ dark, each with broad pale basal band and apical pale spot and a much narrower pale area on base of protarsus; palp with patella and base of tibia pale below; legs mostly black below, femora with narrow pale distal stripe, patellæ with basal white patch, tibiæ with small pale patch at base and at distal end, protarsus also with pale patch in front. *Carapace* about equal to the patella and tibia of 4th and a little less than those segments of 2nd leg.

♂. Like female in colour; 1st and 4th legs only slightly unequal and about four times as long as carapace.

Measurements in mm.— ♀. Total length 50, carapace 23, 1st leg 68, 2nd 63, 3rd 54, 4th 64.

♂. Total length 31, carapace 15, 1st leg 62, 2nd 56, 3rd 48, 4th 60.

Loc. Ceylon: Punduloya and Kandy (*Green*); Peradeniya (*Freeman*).

178. **Pœcilotheria regalis**, *Pocock, A. M. N. H.* (7) iii, p. 89, t. vii, figs. 1–1 *b*, 1899.

♀. *Colour*: carapace greyish, marked in the middle with a pair of longitudinal dark stripes; abdomen with a broad whitish, marginally sinuous band, edged with black, whence black stripes pass laterally on to the sides of the abdomen; coxæ, sternum, and lower side of abdomen deep chocolate-brown, a broad transverse yellowish-red band behind the epigastric fold; upper side of legs and palpi variegated with grey and black, femora black, patellæ and tibiæ whitish below; lower and under sides of femora, patellæ, and tibiæ of 1st and 2nd legs bright sulphur-yellow, of 3rd and 4th bluish white; femora and tibiæ each ornamented with a broad blackish stripe, which on

the femora is narrower than the pale basal area, but much broader than the pale distal area; a very narrow basal stripe on inner side of femora. *Carapace* almost equal to patella and tibia of 2nd leg. Femora of palp and of 1st and 2nd legs fringed externally and internally at apex. Male smaller than female and much more uniformly coloured above.

Measurements in mm.—♀. Total length 53, carapace 25, 1st leg 75, 2nd 65, 3rd 55, 4th 67.

♂. Total length 32, carapace 17·5, 1st leg 73, 2nd 63, 3rd 52·5, 4th 65.

Loc. Southern and Western India: Nilgiri Hills (*Oates*); Coorg; Arkonam in the north Arcot District (*Carter*); Matheran (*Phipson*); Dáhánu in Thana District (*Edie*).

179. **Pœcilotheria striata,** *Pocock, A. M. N. H.* (6) xv, p. 172, 1895; *id. op. cit.* (7) iii, p. 89, 1899.

♀. Closely resembling *P. regalis* in colours &c., but with no band on lower side of abdomen and the yellow on the femora more orange in tint. *Legs* longer than in *P. regalis* (*cf.* measurements); carapace much shorter than patella and tibia of 1st leg, shorter also than those of 4th.

Measurements in mm.—Total length 45, carapace 25; 1st leg 85, 2nd 72, 3rd 59, 4th 74; patella and tibia of 1st leg 31, of 4th 26, protarsus of 4th 19.

Distribution. S. India: Mysore; Trivandrum in Travancore (*Ferguson*)*.

180. **Pœcilotheria formosa,** *Pocock, A. M. N. H.* (7) iii, p. 91, 1899.

♀. *Colour* of upper side much like that of *P. regalis*, but the brown bands on the carapace broader; the pale band on the abdomen less lobate posteriorly; pale band at extremity of tibiæ and protarsi broader; no distinct spots on upper side of tarsi; lower side of the tibia of the palp brown, and the basal segments of the legs much more uniformly dirty white; a large basal black patch on the anterior femora; femora of the 3rd and 4th pairs not or hardly banded distally; no pale band on lower side of abdomen. *Legs* shorter than in *P. regalis* (*cf.* measurements). *Carapace* longer than patella and tibia of 2nd leg. Femora of palpi and of anterior legs scarcely fringed.

Measurements in mm.—Total length 54, carapace 26, 1st leg 69, 2nd leg 61, 3rd leg 54, 4th leg 65.

Loc. S. India: Kadiampatti and Mallápuram in the Salem District (*Carter & West*).

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* The type of the species is ticketed "Penang (*Hardwicke*)." No doubt, however, the locality is erroneous, since the species has of late years been discovered in S. India, but has not been obtained in Penang.

181. **Pœcilotheria vittata,** *Pocock, A. M. N. H.* (6) xv, p. 172, 1895 *id. op. cit.* (7) iii, p. 89, 1899.

♂. *Colour* a tolerably uniform yellowish olive above; femora of 1st and 2nd legs dirty white below without basal black patch, the black band twice as broad as the pale distal area, patellæ pale below, tibiæ with pale extremities; femora of 3rd and 4th legs uniformly dark, with greyish-pink bristles, tibiæ paler at base. *Legs* practically as in *P. regalis* as regards length &c.

Measurements in mm.—Total length 34, carapace 17, 1st leg 72, 2nd 63, 3rd 57, 4th 66.

Loc. India or Ceylon (exact place unknown).

182. **Pœcilotheria fasciata,** *Latreille, Nouv. Dict. d'Hist. Nat.* xv, p. 304, 1803; *C. Koch, Arachn.* ix, p. 41, p. 717, 1842 (Mygale).

♀. *Colour* as in *P. regalis* and *formosa*, but with a black basal patch in front on anterior femora, the black stripe only one-third as wide as the pale basal area and not or scarcely wider than the pale distal area; stripe on femur of 3rd leg also narrow and on 4th very narrow or incomplete. *Legs* without or with weak femoral fringes, shorter than in *P. striata* (*cf.* measurements); carapace slightly exceeding patella and tibia of 4th.

♂. Like female in colour, but with pattern of upper side indistinct.

Measurements in mm.—♀. Total length 46, carapace 24, 1st leg 77, 4th 67.

♂. Total length 35, carapace 16·5, 1st leg 66, 4th 60.

Loc. Ceylon: Trincomali (*Bassett-Smith*); Kandy (*Yerbury & Green*); Punduloya (*Green*).

Simon (Bull. Soc. Zool. Fr. 1885, p. 38) records *P. fasciata* from Madura, S. India. The specimen so named is perhaps referable to *P. regalis* or *P. formosa.*

183. **Pœcilotheria ornata,** *Pocock, A. M. N. H.* (7) iii, p. 93, 1899.

♀. *Colour* like that of *P. fasciata*, but the femoral stripes much broader, that on 4th leg complete and as broad as the pale basal area; on 3rd broader than the pale basal area, on 1st and 2nd much broader than pale distal area and half as broad as pale basal area. *Legs* with thick femoral fringe. *Carapace* shorter than patella and tibia of 1st or of 4th leg.

Measurements in mm.—Total length 46, carapace 19, 1st leg 64, 2nd 58, 3rd 49, 4th 61.

Loc. S. Ceylon: Ratnapura (*Burrows*).

Genus **CHILOBRACHYS**, Karsch.

Chilobrachys, *Karsch, Berl. ent. Zeits.* xxxvi, p. 270, 1892; *Pocock, A. M. N. H.* (6) xv, p. 171, 1895.
Musagates, *Pocock, A. M. N. H.* (6) xv, p. 171, 1895.

Large or small, mostly dull-coloured, Spiders, differing from *Pœcilotheria* in having the *carapace* less flat, the *fovea* crescentically procurved, the *eyes* of the anterior line practically straight, the spines on the mandible and the bacilli on the maxilla more numerous, and in the series of bacilli not being accompanied by tubercles. *Legs* with scopulæ narrower and with spines at the tip of protarsi. *Palpal organ* of the male ending in a long and slender or in a shorter blade-like spine.

Type, *C. nitelinus*, Karsch.

Distribution. India, Ceylon, and Burma.

Habits. Live on the ground in burrows or in natural crevices.

Synopsis of Indian Species.

Males.

a. Carapace shorter than protarsus of 4th and not exceeding patella and tibia of 3rd leg ...... *C. andersoni*, p. 197.

b. Carapace longer than protarsus of 4th and than patella and tibia of 3rd leg.

- a^1. Carapace as long as patella and tibia of 1st or of 4th leg .... *C. femoralis*, p. 195.
- b^1. Carapace shorter than patella and tibia of 1st or of 4th leg.
  - a^2. Palpus twice as long as carapace ...... *C. nitelinus*, p. 197.
  - b^2. Palpus much less than twice as long as carapace.
    - a^3. Spine of palpal organ stout, blade-like, abruptly narrowed at the point.
      - a^4. Femora of palpi and of 1st and 2nd legs sooty black below and externally fringed .... *C. fimbriatus*, p. 195.
      - b^4. Femora of palpi and of 1st and 2nd legs particoloured below; not fringed.
        - a^5. Width of carapace exceeding tibia of 1st or protarsus of 4th leg .... *C. bicolor*, p. 196.
        - b^5. Width of carapace equal to tibia of 1st and less than protarsus of 4th leg .... *C. flavo-pilosus*, [p. 196.
    - b^3. Spine of palpal organ slender, attenuate.
      - a^6. Area of palpal bulb remote from base of spine, produced into an anguliform prominence .... *C. thorellii*, p. 199.
      - b^6. Palpal bulb with scarcely a trace of prominence.
        - a^7. Fringe of hairs overlapping bacilli on maxilla olive; hairs of body and legs blackish .... *C. pocockii*, p. 195.
        - b^7. Fringe on maxilla shining red; hairs of body and legs brown
          - a^8. Femora of legs scantily clothed with long hairs; carapace just exceeding protarsus of 4th leg. *C. stridulans*, p. 198.

b^8. Femora of legs with many long hairs; carapace considerably exceeding protarsus of 4th leg.
a^9. Carapace shorter than patella and tibia of 2nd leg ...... *C. hardwickii*, p. 198.
b^9. Carapace a little longer than patella and tibia of 2nd leg.. *C. sericeus*, p. 199.

Females.

a. Underside of palpi and of 1st and 2nd legs black internally, yellow externally.
a^1. 4th leg a little longer than 1st; protarsus and tarsus of 4th longer than carapace .. *C. flavo-pilosus*, p. 196.
b^1. 4th leg much shorter than 1st; protarsus and tarsus of 4th shorter than carapace .. *C. bicolor*, p. 196.
b. Palpi and anterior legs uniformly coloured beneath.
a^2. Spicules on outer side of mandible arranged in very definite parallel rows............ *C. fumosus*, p. 196.
b^2. Spicules on outer side of mandible irregularly arranged.
a^3. Femora of palp and of anterior legs fringed externally; 1st leg much longer than 4th. *C. fimbriatus*, p. 195.
b^3. Femora of palp and of anterior legs not fringed; 1st leg not longer than 4th.
a^4. Carapace much shorter than patella and tibia of 1st leg.
a^5. Sternum and legs sooty black beneath; legs with pale bands above ...... *C. masoni*, p. 197.
b^5. Sternum and legs brown beneath; legs not banded above .... *C. andersoni*, p. 197.
b^4. Carapace not much or scarcely shorter than patella and tibia of 1st leg.
a^6. Hairy clothing of body and limbs blackish; fringe overlapping bacilli on maxilla olive-green .... *C. pocockii*, p. 195.
b^6. Hairy clothing of body and limbs yellowish or greyish brown; fringe on maxilla shining red.
a^7. Width of head about equal to length of 4th protarsus.
a^8. Size large: carapace about 17 mm. long................ *C. hardwickii*, p. 198.
b^8. Size small: carapace about 12 mm. long................ *C. nitelinus*, p. 197.
b^7. Width of head much less than length of 4th protarsus.
a^9. 4th leg long, almost three times as long as carapace; paler .... *C. sericeus*, p. 199.
b^9. 4th leg short, about two and a half times the length of the carapace; darker .... *C. brevipes*, p. 199.

184. **Chilobrachys fimbriatus**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 746, 1899.

♀. *Colour*: integument blackish, covered above with yellowish hairs, intermixed with reddish bristles on the limbs and abdomen; abdomen marked with narrow dark stripes above, velvety black below, like under side of the limbs. *Carapace* as long as patella and tibia of 1st leg, much longer than those of the 4th, and a little longer than protarsus and tarsus of 4th. 1st *leg* longer than 4th; femora of palpi and anterior legs thickly fringed externally.

♂. *Carapace* shorter than patella and tibia of 2nd leg, as long as protarsus and half the tarsus of the 4th. Femur of 3rd *leg* thick. Spine of *palpal organ* thick, blade-like, abruptly narrowed at the point.

Measurements in mm.—♀. Total length 45, carapace 26, 1st leg 67, 2nd 59, 3rd 51, 4th 63, patella and tibia of 4th 23.

♂. Total length 30, carapace 16, 1st leg 54, 2nd 48, 3rd 39, 4th 53, patella and tibia of 1st 21·5, of 4th 13·5.

Loc. Western India: Khandálá (*Phipson*); Jaoli in Satára (*Master*).

185. **Chilobrachys femoralis**, sp. n.

♂. *Colour*: integument jet-black; hairs on carapace golden yellow, elsewhere duller yellow and intermixed with red bristles. *Carapace* as long as patella and tibia of 1st or of 4th legs, longer than those of 2nd, and almost as long as protarsus and tarsus of 4th, very slightly longer than patella, tibia, and tarsus of palp. *Legs* short, 1st and 4th almost equal; femur of 3rd very thick. *Palpal organ* with spine thickish and blade-like, abruptly narrowed and pointed apically.

Measurements in mm.—Total length 22, carapace 11, 1st leg 31, 2nd 28, 3rd 25, 4th 32·5, patella and tibia of 1st 11·5, of 4th 11·5.

Loc. Western India: Násik (*Millet*).

186. **Chilobrachys pocockii**, *Thorell, Ann. Mus. Genova*, xxxvii, p. 180, 1897 (Musagetes).

♀. *Colour*: integument blackish, hairy clothing deep olive-brown. *Carapace* as long as patella and tibia of 1st, longer than those of 4th, and almost as long as protarsus and tarsus of 4th leg. Fringe overhanging stridulating *bacilli* olive-green, not bright red as in the other species; the bacilli set several rows deep, except at the two ends of the cluster.

♂. *Carapace* shorter than patella and tibia of 2nd, less than protarsus and half the tarsus of 4th leg. Spine of *palpal organ* slender, very long, strongly curved, its distal half bent nearly at right angles, the point slightly expanded.

Measurements in mm.—♀. Total length 46, carapace 20, 1st leg 53, 2nd 45, 3rd 41, 4th 54, patella and tibia of 4th 18.

♂. Total length 27, carapace 14, palp 23, 1st leg 48, 2nd 14, 3rd 36, 4th 48·5, patella and tibia of 4th 16, of 1st 19.

Loc. Upper Burma: Thao and Bia-po in Karennee (*Fea*).

187. **Chilobrachys bicolor**, *Pocock, A. M. N. H.* (6) xv, p. 172, 1895 (Musagetes).

♀. *Colour*: carapace and abdomen covered with yellowish-brown hairs; legs similarly coloured, with the femora much darker and the inner and anterior half of the under side of the 1st and 2nd pairs velvety black. *Carapace* as long as patella and tibia of 1st leg, longer than those of 4th, and much longer than protarsus and tarsus of 4th; width of head equal to 4th protarsus. 1st *leg* longer than 4th.

♂. *Carapace* exceeding protarsus and half the tarsus of the 4th leg, scarcely shorter than patella and tibia of 2nd, a little shorter than those of 4th. Spine of *palpal organ* broad and flattened, with slight spiral twist and a sharp point (fig. 62, D, p. 198).

Measurements in mm.—♀. Total length 49, carapace 22, 1st leg 56, 2nd 48, 3rd 42, 4th 52, patella and tibia of 1st 22.

♂. Total length 35, carapace 19, palp 30, 1st leg 60, 2nd 53, 3rd 46, 4th 58, patella and tibia of 1st leg 24, of 4th 20.

Loc. Upper Burma: Kyaukse (*Oates*); Myingya (*Watson*).

188. **Chilobrachys flavo-pilosus**, *Simon, Ann. Mus. Genova*, xx, p. 358, 1884 (Phrictus): cervinus, *Thorell, Spiders of Burma*, p. 5, 1895, in part, ♀: fuligineus, *id. op. cit.* p. 8, in part (Phlogius): decipieus, *id. Ann. Mus. Genova*, xxxvii, p. 179, 1897 (Musagetes).

Resembling *C. bicolor* in colour, but smaller and with longer legs.

♀. *Carapace* at most slightly longer than patella and tibia and a little shorter than protarsus and tarsus of 4th leg; 4th leg a little longer than 1st.

♂. 4th and 1st legs subequal. *Palpal organ* with spine weaker than in *C. bicolor*.

Measurements in mm.—♀. Total length 37, carapace 15·5, 1st leg 42, 2nd 37, 3rd 33, 4th 43, patella and tibia of 4th 15, of 1st 16·5.

♂. Total length 35, carapace 16·5, palp 27, 1st leg 54, 2nd 49, 3rd 43·5, 4th 54, patella and tibia of 4th 18·5.

Loc. Burma: Minhla (*Comotto*); Thayetmyo and Tharrawaddy (*Oates*).

189. **Chilobrachys fumosus**, *Pocock, A. M. N. H.* (6) xv, p. 174, pl. x, fig. 7, 1895 (Musagetes).

♀. *Colour* of integument and hairs mostly blackish, the longer bristles reddish. Distinguishable from the rest of the species by having the *spicules* on the mandible arranged in four definite parallel rows. *Carapace* a little longer than patella and tibia of 1st

or 4th legs, only a little shorter than protarsus and tarsus of 4th. 4th *leg* much longer than 1st.

Measurements in mm.—Total length 36, carapace 18, 1st leg 44, 2nd 39, 3rd 37·5, 4th 50, patella and tibia of 1st 17, of 4th 16.

Loc. North India.

190. **Chilobrachys masoni**, *Pocock, A. M. N. H.* (6) xv, p. 174, pl. x, fig. 6, 1895 (Musagetes).

Colour: integument clothed with yellowish-brown hairs above, velvety black on lower surface of body and limbs; upper side of limbs with narrow pale longitudinal lines, and on the apices of the segments with narrow transverse pale bands. *Carapace* shorter than patella and tibia of 1st, longer than those of 2nd, equal to those of the 4th leg, nearly as long as protarsus and tarsus of 4th; width of head much less than protarsus of 4th.

Measurements in mm.—Total length 41, carapace 20, 1st leg 54, 2nd 49, 3rd 44, 4th 57, patella and tibia of 1st leg 22, of 4th 20.

Loc. Assam: Sylhet.

191. **Chilobrachys andersoni**, *Pocock, A. M. N. H.* (6) xv, p. 172, 1895, ♀ (Musagetes): cervinus, *Thorell, Spiders of Burma*, p. 5, 1895, in part, ♂ (Phlogius): rufo-fuscus, *Thorell, Ann. Mus. Genova*, xxxvii, p. 177, 1897, ♀ (Musagetes).

♀. Principally differing from *C. masoni* in being uniformly coloured with yellowish-brown hairs.

♂. Distinguishable by the great length of the legs; *carapace* considerably shorter than protarsus of 4th, equal to patella and tibia of 3rd leg. *Legs* of 4th pair more than four times as long as carapace. *Palpal organ* with spine stout, bicarinate, attenuate, with a small blunt point.

Measurements in mm.— ♀. Total length 54, carapace 25, 1st leg 68, 4th 72, patella and tibia of 4th 24.

♂. Total length 30, carapace 14, palp 28, 2nd leg 51, 3rd 44, 4th 60, patella and tibia of 4th 19, protarsus 16.

Loc. Tenasserim (*Oates*); Mergui (*Anderson*); Kawkareet (*Fea*).

192. **Chilobrachys nitelinus**, *Karsch, Berl. ent. Zeits.* xxxvi, p. 270, t. x, fig. 2, 1892.

♀. *Colour*: integument deep brown, hairy clothing yellowish brown. *Carapace* about as long as patella and tibia of 1st leg, longer than those of 4th and than protarsus and tarsus of 4th; width of head about equal to length of 4th protarsus.

♂. *Carapace* a little less than patella and tibia of 2nd leg, a little longer than protarsus of 4th. *Palp* long, about twice the length of the carapace; spine of organ curved, pointed; bulb without prominence.

Measurements in mm.— ♀. Total length 26, carapace 12, 1st leg

30, 2nd 26, 3rd 23, 4th 31·5, patella and tibia of 1st 11·5, of 4th 11·3.

♂. Total length 16, carapace 9, palp 18, 1st leg 32, 2nd 28, 3rd 25, 4th 34, patella and tibia of 1st 11·5, of 4th 11.

Loc. Ceylon (*Sarasin*): Punduloya and Dikoya (*Green*).

193. **Chilobrachys hardwickii**, *Pocock, A. M. N. H.* (6) xv, p. 174, 1895.

♀. Resembling that of *C. nitelinus*, but much larger; legs of 1st and 4th pairs subequal, patella and tibia of 1st leg distinctly longer than of 4th.

♂. *Carapace* shorter than patella and tibia of 2nd leg, equal to protarsus and half the tarsus of the 4th, more than half the length of the palpus. *Legs* with femora thickly clothed with bristles beneath. Bulb of *palpal organ* without anterior prominence, the spine longish, attenuate, pointed at apex (fig. 62, C).

Measurements in mm.—♀. Total length 34, carapace 18, 1st leg 43, 3rd 34, 4th 43, patella and tibia of 1st leg 17·3, of 4th 15.

♂. Total length 27, carapace 14, palpus 23, 1st leg 46, 2nd 40, 3rd 34, 4th 44, patella and tibia of 1st leg 18·5, of 4th 16.

Loc. Shahjahánpur in North-west Provinces; Bilaspur in Central Provinces (*Phipson*); Chota Nagpur (*Logsdail*); Burdwan (*Hardwicke*).

194. **Chilobrachys stridulans**, *Wood-Mason, P. A. S. B.* 1875, p. 197 *id. Tr. Ent. Soc.* 1877, p. 281, pl. vii (Mygale).

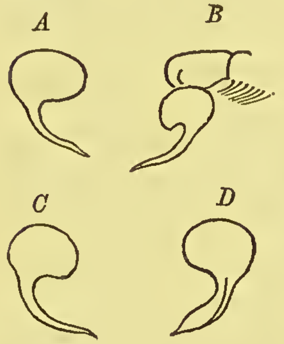

Fig. 62.—A. Palpal organ of ♂ of *Chilobrachys stridulans*; B, of *C. thorellii*; C, of *C. hardwickii*; D, of *C. bicolor.*

Allied to *C. hardwickii*, but with the appendages less hairy and longer. *Carapace* shorter than the patella, tibia, and half the tarsus of the palp, and just exceeding the protarsus of the 4th leg. 1st and 4th *legs* subequal. *Palpal organ* (fig. 62, A) shorter than half the length of the tibia; the spine shorter and straighter than in *C. hardwickii.*

Measurements in mm.—Total length 28, carapace 14, palp 25, 1st leg 50, 2nd 42·5, 3rd 37, 4th 49·5, patella and tibia of 1st leg 20, of 4th 16·5.

Loc. Assam: Sibsagar (*Peal*).

195. **Chilobrachys thorellii**, sp. n.

♂. Distinguishable from *C. hardwickii* and *C. stridulans* by having the portion of the bulb of the palpal organ remote from the spine produced into an anguliform prominence (fig. 62, B). Nearly resembling *C. stridulans* in length of legs, &c., but with the 1st leg shorter.

Measurements in mm.—Total length 30, carapace 14, palpus 23, 1st leg 48, 4th leg 49, patella and tibia of 1st 19, of 4th 16.

Loc. Assam : Sadiya.

196. **Chilobrachys brevipes**, *Thorell, Ann. Mus. Genova*, xxxvii, p. 179, 1897 (Musagetes).

♀. *Colour*: integument blackish, hairy clothing deep olive-yellow. *Carapace* scarcely longer than patella and tibia of 1st leg, slightly longer than those of 4th, a little shorter than protarsus and tarsus of 4th, width of head distinctly less than protarsus of 4th leg.

Measurements in mm.—Total length 27, carapace 12, 1st leg 29, 2nd 25, 3rd 23, 4th 31, patella and tibia of 1st leg 11·5, of 4th 11.

Loc. Burma: Tharrawaddy (*Oates*).

197. **Chilobrachys sericeus**, *Thorell, Spiders of Burma*, p. 10, 1895 (Phlogius).

♀. Closely allied to female of *C. nitelinus* and *hardwickii*, but the width of the head much less than length of 4th protarsus.

♂. Smaller than male of *C. hardwickii*, with the carapace not shorter than the patella and tibia of 2nd leg, a little shorter than those of 4th. Bulb of *palpal organ* rounded ; spine subfiliform, but ending in a small blunt point.

Measurements in mm.— ♀. Total length 24, carapace 10·5, 1st leg 27·5, 2nd 24, 3rd 21·5, 4th 30, patella and tibia of 1st leg 11, of 4th 10.

♂. Total length 22, carapace 10, palp 15, 1st leg 31, 2nd 26, 3rd 24, 4th 32, patella and tibia of 1st leg 12·5, of 4th 11.

Loc. Burma: Rangoon (*Oates*).

The following species, based upon females, are of doubtful validity :—

Chilobrachys soricinus, *Thorell, Ann. Mus. Genova*, xxv, p. 15, 1888 (Phrictus).

♀. A little larger than the type of *C. sericeus*, with the patella and tibia of 1st leg a little longer as compared with the carapace, and the anterior lateral eyes a little larger as compared with the median.

Loc. Burma: Bhamo (*Fea*).

The specimen identified and described by Thorell in 1897 as *Musagetes soricinus* appears from the leg-measurements to differ specifically from the original *soricinus*.

Chilobrachys oculatus, *Thorell, Spiders of Burma*, p. 13, 1895 (Phlogius).

Based upon a mutilated and doubtfully adult specimen, resembling the type of *C. soricinus* in having the anterior lateral eyes of large size.

Loc. Arrakan: Akyab (*Oates*).

Genus SELENOCOSMIA, Auss.

Selenocosmia, *Ausserer, Verh. z.-b. Ges. Wien*, 1871, p. 204; *Pocock, A. M. N. H.* (6) xv, p. 170, 1895.

Phrictus, *L. Koch, Arach. Austral.* p. 488, 1874 (nom. præocc.).

Phlogius, *Simon, Bull. Soc. Ent. Fr.* (6) vii, p. cxcv, 1887; *id. Hist. Nat. Araign.* i, p. 146, 1892.

Closely resembling *Chilobrachys*, but with the spines on the outer side of the mandible long, setiform, and but little differentiated from the oral fringe; while on the maxilla the cluster of bacilli is large and oval, the bacilli lying several rows deep, and there is no fringe of hairs overhanging the bacilli.

Type, *S. javanensis*, Walck.

Distribution. Himalayas, Burma, thence eastwards and southwards into Australia.

Synopsis of Indian Species.

a. Patellæ paler than the rest of the segments of the legs .... *S. himalayana*, p. 200.

b. Patellæ the same colour as the rest of segments of the legs and palpi.

 a¹. Tarsal scopula of 4th leg divided; cluster of bacilli on maxilla twice as long as broad .... *S. fuliginea*, p. 201.

 b¹. Tarsal scopula of 4th leg undivided; cluster of bacilli on maxilla only a little longer than broad .... *S. javanensis*, p. 201.

198. **Selenocosmia himalayana**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 746, 1899.

♀. *Colour*: integument blackish; carapace and patellæ covered with greyish-yellow hairs, rest of the leg-segments and abdomen blackish brown. *Carapace* with head low, a little longer than patella and tibia of 1st and 4th legs; eyes of anterior line straight. *Stridulating-bristles* on mandible spiniform. Tarsal scopula of 4th *leg* divided by band of setæ; patella and tibia of 1st and 4th legs about equal.

Measurements in mm.—Total length 32, carapace 15, 1st leg 37, 2nd 33, 3rd 31, 4th 43.

Loc. North India : Dehra Dún (*Gleadow*).

199. **Selenocosmia fuliginea**, *Thorell, Spiders of Burma*, p. 8, 1895 (Phlogius).

♀. Uniformly coloured and darker than *S. himalayana*. *Carapace* not quite so long as patella and tibia of 4th leg; cephalic region higher; anterior line of eyes procurved, laterals distinctly smaller than medians. Cluster of bacilli on *maxilla* twice as long as wide, narrowed distally; bristles on mandible slender, evenly attenuate. Patella and tibia of 1st and 4th *legs* about equal; tarsal scopula of 4th divided.

Measurements in mm.—Total length 37, carapace 15, 1st leg 40, 2nd 33, 3rd 29, 4th 42.

Loc. Burma : Tharrawaddy (*Oates*).

200. **Selenocosmia javanensis**, *Walck. Ins. Apt.* i, p. 216, 1837.

♀. Paler in colour than *S. fuliginea*. *Carapace* a little longer than patella and tibia of 4th leg; anterior lateral eyes as long as the medians. Cluster of bacilli on *maxilla* thick, with distal end broad and rounded; bristles on mandible more abundant and attenuate than in *S. fuliginea*. *Legs* with tarsal scopula of 4th not completely divided; patella and tibia of 1st leg longer than of 4th.

Measurements in mm.—Total length 42, carapace 20, 1st leg 52, 2nd 45, 3rd 41, 4th 55.

Loc. Lesser Nicobar (according to *Thorell*); Java.

The following species, based upon immature individuals, cannot be satisfactorily classified:—

Selenocosmia orophila, *Thorell, Ann. Mus. Genova*, xxxvii, p. 175, 1897 (Phlogius).

♀. *Carapace* with thoracic fovea larger than in *S. javanensis* and *S. fuliginea*, about as long as patella and tibia of 1st or 4th leg; size of eyes and shape of cluster of bacilli approaching those of *S. javanensis*; bristles on mandible more like those of *S. fuliginea*. Tarsal scopulæ of 3rd and 4th *legs* divided.

Measurements in mm.—Total length 14, carapace 6·5, 1st leg 16, 4th 17.

Loc. Burma : Bia-po in Karennee (*Fea*).

Genus PHLOGIELLUS, Pocock *.

Phlogiellus, *Pocock, Abh. Senck. naturf. Ges.* xxiii, pt. 4, p. 595, 1897

Resembling *Selenocosmia* in the structure of the stridulating-organ and in most structural features, but distinguishable by having the tarsal scopulæ of all the legs divided by a band of setæ and by the retention of the inferior tarsal claw on the posterior pair of legs.

Type, *P. inermis*, Auss.

Distribution. Java; Nicobar Islands.

201. **Phlogiellus subarmatus,** *Thorell, Sv. Vet.-Akad. Handl.* xxiv, no. 2, p. 13, 1891 (Ischnocolus).

Colour: integument blackish, hairy clothing ashy red. *Carapace* low. *Legs* rather short; scopulæ on anterior legs scanty, on posterior legs thick and divided by a band of setæ.

Measurements in mm.—Total length 15·5, carapace 6, 1st leg 15, 4th 17.

Loc. Nanchoury in the Nicobar Islands (according to *Thorell*).

Genus LYROGNATHUS, Pocock.

Lyrognathus, *Pocock, A. M. N. H.* (6) xv, p. 170, 1895.

At once distinguishable from the rest of the genera of the subfamily by having the *legs* of the 4th pair much thicker than the rest, with the protarsal scopula extending almost up to the base of the segment; 3rd leg thicker than 2nd, with the scopula also covering the protarsus beneath.

Stridulating-organ and other characters as in *Selenocosmia*.

Type, *L. crotalus*, Poc.

Distribution. North-east India.

Synopsis of Indian Species.

a. Eyes of anterior line close to the edge of the carapace .... *L. pugnax*, p. 203.

b. Eyes of anterior line about twice their own diameter from edge of clypeus.

  a^1. Legs longer; tibia of 4th about three times as long as high .... *L. saltator*, p. 203.

  b^1. Legs shorter; tibia of 4th only about twice as long as high .... *L. crotalus*, p. 203.

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* Based upon a Javan species, *P. atriceps*, which Prof. Kulczynski informs me (*in litt.*) is identical with *Ischnocolus inermis* of Ausserer. According to Thorell, *I. subarmatus* is also identical with *I. inermis*—an opinion of which the correctness may be questioned.

202. **Lyrognathus crotalus**, *Pocock, A. M. N. H.* (6) xv, p. 175, 1895.

♀. *Colour*: integument blackish brown, covered with dusky brown hairs, intermixed with foxy-grey bristles on legs and abdomen. *Carapace* nearly one-third longer than wide, only very slightly shorter than protarsus and tarsus of 4th leg, or than tibia, protarsus, and tarsus of 3rd, distinctly longer than patella, tibia, and tarsus of palp. *Eyes* of anterior line separated from edge of clypeus by about twice their diameter, medians larger than laterals. Tibia and protarsus of 4th *leg* with a very thick clothing of short erect hairs, intermixed with long bristles; tibia about as wide as high, its height almost equal to half its length.

Measurements in mm.—Total length 26, carapace 13·5, palp 19, 1st leg 32, 2nd and 3rd legs 27, 4th leg 41, tibia of 4th 8, height of latter 3·5.

Loc. North India.

203. **Lyrognathus saltator**, sp. n.

Allied to the foregoing, but with the *legs* longer (*cf.* measurements); tibia and protarsus of 4th leg less thickly hairy, the former about three times as long as high. *Carapace* about one-fourth longer than wide, as long as the protarsus and two-thirds of the tarsus of the 4th, scarcely longer than patella, tibia, and tarsus of palp, and noticeably shorter than tibia, protarsus, and tarsus of 3rd.

Measurements in mm.—Total length 32, carapace 15, palpus 22·5, 1st leg 37, 2nd and 3rd legs 32, 4th leg 49, tibia of 4th 10·5, height of latter 3·5.

Loc. Assam: North Khási Hills.

204. **Lyrognathus pugnax**, sp. n.

Allied to the preceding, and especially to *L. saltator*, but at once distinguishable by having the anterior line of *eyes* close to the edge of the carapace, and separated therefrom by a space which is only about equal to the diameter of the eyes. Tibia of 4th *leg* higher than in *L. saltator*, but not so high as in *L. crotalus* (*cf.* measurements).

Measurements in mm.—Total length 34, carapace 16, 1st leg 40, 2nd and 3rd legs 34, 4th leg 52, tibia of 4th 11, height of latter 4·5.

Loc. Assam: Shillong (*Peal*).

Subfamily ORNITHOCTONINÆ.

Mandible furnished externally with a dense pad (scopula) composed of short, close-set, plumose hairs; between the scopula and the oral fringe there is a naked area, which, however, bears posteriorly a small number (about four) of large, lightly curved, plumose

bristles springing from the scopula above (fig. 64, *a*). Inner surface of maxilla sparsely hairy, but furnished both above and below the suture with a small number of black tooth-like tubercles (fig. 63).

Fig. 63.—Inner surface of maxilla of *Ornithoctonus andersoni*, showing the spines.

Fig. 64.—Outer surface of mandible of *Ornithoctonus andersoni*. *a*. Stridulating-bristles.

Posterior sternal sigilla remote from the margin. Legs with a few spines at apex of tibiæ and protarsi *; tarsal scopulæ thick and undivided.

Distribution. From Burma and Siam southwards aud eastwards to the Moluccas.

Synopsis of the Burmese Genera.

a. Carapace low, ocular tubercle close to edge of clypeus........................ CYRIOPAGOPUS, p. 204.

b. Carapace elevated in the cephalic region; ocular tubercle some distance behind edge of clypeus.

  *a*¹. Legs strong and short; fovea large, scarcely procurved .... ORNITHOCTONUS, p. 205.

  *b*¹. Legs slender and long; fovea small and concentric........................ MELOPŒUS, p. 205.

Genus CYRIOPAGOPUS, Simon.

Cyriopagopus, *Simon, J. A. S. B.* lvi, p. 110, 1887; *id. Hist. Nat. Araign.* i, p. 152, 1892.

Omothymus, *Thorell, K. Sv. Vet.-Akad. Handl.* xxiv, no. 2, p. 10, 1891; *Pocock, A. M. N. H.* (6) xv, p. 179, 1895.

Carapace low, flattish, the cephalic region gradually aud evenly inclined between the fovea and the ocular tubercle; fovea sublinear, transverse, at most slightly procurved; ocular tubercle low and wide, close to the edge of the clypeus; eyes of anterior line subequal, scarcely procurved. Male with very long legs; tibia of 1st with a single short blunt spur.

Type, *C. paganus*, Simon.

Distribution. Tenasserim and Penaug.

* Simon is mistaken in stating that the legs of the type specimen of *Cyriopagopus paganus* are without spines.

205. **Cyriopagopus paganus**, *Simon, J. A. S. B.* lvi, p. 111, 1887.

Colour: integument reddish brown, clothed with greyish-brown pubescence and reddish bristles; ends of leg-segments narrowly white; abdomen obscurely banded. *Carapace* as long as patella and tibia of 1st leg, a little shorter than those of 4th and than protarsus and tarsus of this limb.

Measurements in mm.—Total length 35, length of carapace 14·5, width 12, length of 1st leg 39 (patella + tibia 14·5), 2nd 35, 3rd 32, 4th 43 (patella + tibia 15, protarsus 10).

Loc. Tenasserim: Tavoy (*Moti Ram*).

Genus **MELOPŒUS**, Pocock.

Melopœus, *Pocock, A. M. N. H.* (6) xv, p. 179, 1895.

Carapace with the cephalic region elevated, the area between the fovea and the ocular tubercle distinctly convex both longitudinally and transversely; fovea narrow and crescentically procurved; ocular tubercle high, subcircular, some distance behind the edge of the clypeus. *Legs* long and slender, the 4th thinner than the 1st, its tibia about four times as long as wide. Anterior tibia of male with a single blunt spur as in *Cyriopagopus*.

Type, *M. albostriatus* (Simon).

Distribution. Siam and Tenasserim.

206. **Melopœus minax**, *Thorell, Ann. Mus. Genova,* xxxvii, p. 182, 1897.

♀. *Colour*: integument blackish, clothed with ruddy brown hairs; ends of leg-segments whitish; abdomen obscurely banded above. *Carapace* as long as patella and tibia and one-fourth of the protarsus of the 1st and 4th legs, very slightly exceeding protarsus and tarsus of 4th; width equal to patella and tibia of 2nd, greater than those of 3rd. *Legs* scantily clothed with bristles, patella and tibia of 4th leg a little shorter than of 1st.

Measurements in mm.—Total length 44, length of carapace 24, 1st leg 59, 2nd 52, 3rd 47, 4th 61, patella + tibia of 4th leg 21, of 1st 22·5.

Loc. Tenasserim: Kawkareet (*Fea*).

Genus **ORNITHOCTONUS**, Pocock.

Ornithoctonus, *Pocock, Jour. Linn. Soc., Zool.* xxiv, p. 317, 1892; *id. A. M. N. H.* (6) xv, p. 179, 1895.

Resembling *Melopœus* in having the fore part of the *carapace* elevated, the ocular tubercle small and situated at some distance from the edge of the clypeus; but differing in having the thoracic *fovea* deep, wide, and scarcely procurved, and the *legs* stout and short, the 4th pair being as thick as the 1st, the width of the tibia of the 4th being more than one-third of the length. Male unknown.

Type, *O. andersoni*, Poc.

Distribution. Burma.

207. **Ornithoctonus andersoni**, *Pocock, Jour. Linn. Soc., Zool.* xxiv, p. 317, pl. xxii, figs. 1–3, 1892.

♀. *Colour*: a nearly uniform reddish brown, darker beneath and on femora, some white hairs at the extremities of the leg-segments. *Carapace* as long as the patella and tibia and one-fourth of the protarsus of the 1st or 4th legs, considerably exceeding protarsus and tarsus of 4th. *Legs* somewhat thickly hairy, 1st and 4th subequal and considerably less than two and a half times the length of the carapace; patella and tibia of 4th leg a little less than of 1st.

Measurements in mm.—Total length 52, carapace 25, 1st leg 61, 2nd and 3rd 54, 4th 62, patella + tibia of 4th 12, of 1st 23.

Loc. Tenasserim: Mergui (*Anderson*).

Suborder *ARACHNOMORPHÆ*.

Differing from the Mygalomorphæ in having the basal segment of the *mandible* articulated in a horizontal plane to the under side of the head and directed downwards, the *fang* closing obliquely inwards (fig. 52, p. 155). The posterior *respiratory organs* are in the form of tracheal tubes, which in most cases open by a common aperture just in front of the spinners. *Spinning-mamillæ* normally six in number, often accompanied by the *cribellum* or the *colulus*. Coxa of *palp* furnished with a large maxillary process. *Sternum* without distinct sigilla (at least in the Indian genera).

Distribution. Subarctic, temperate, and tropical countries.

With the exception of one or two forms of doubtful systematic position or great scarcity, the Indian species of Arachnomorphæ may be referred to the following families (those that are printed in italics have been omitted from the present volume):—

Synopsis of the principal Indian Families.

a. Cribellum and calamistrum present.
- *a*¹. Head-region large, rounded, high; posterior lateral eyes remote from the rest .... **Eresidæ.**
- *b*¹. Head low, narrowed, not strongly rounded; posterior lateral eyes very rarely remote from the others.
  - *a*². Tarsi furnished with ungual tufts and an inferior claw .... **Psechridæ.**
  - *b*². Tarsi without ungual tufts.
    - *a*³. Anal papilla long and conically acuminate . *Uloboridæ.*
    - *b*³. Anal papilla short, semicircular .... *Dictynidæ.*

b. Cribellum and calamistrum absent.
- *a*⁴. Sternum much wider than long; the posterior coxæ widely separated .... **Platoridæ.**
- *b*⁴. Sternum not wider than long; posterior coxæ not widely separated.
  - *a*⁵. Posterior spinners absent or much shorter than the anterior .... *Zodariidæ.*

b^5. Posterior spinners present, not shorter than anterior.

a^6. 1st leg enormously thick, with tarsus pedunculate and almost clawless .... *Palpimanidæ.*

b^6. 1st leg typically subsimilar to the rest (larger in most Attidæ); its tarsus normal and clawed.

a^7. Posterior spinners enormously long and apically slender .... **Hersiliidæ**

b^7. Posterior spinners shorter and thick.

a^8. Anal papilla very large, fringed with long hairs; posterior spinners much larger than anterior................ **Urocteidæ.**

b^8. Anal papilla small, not fringed; posterior spinners generally subequal to the anterior.

a^9. Claws 3; no ungual tufts.

a^{10}. Tarsus of 4th leg with comb of spines below .... **Theridiidæ.**

b^{10}. Tarsus of 4th leg without comb of spines.

a^{11}. Maxillæ inclined on labium; mandibles scarcely toothed; legs very long and slender .... **Pholcidæ.**

b^{11}. Maxillæ not inclined on labium; mandibles toothed; legs shorter and thicker.

a^{12}. Tarsi armed apically with curved serrate spines. Sedentary web-weavers .... **Argyopidæ.**

b^{12}. Tarsi without serrate spines at apex. Hunting Spiders.

a^{13}. Mandibles powerful, toothed; labium and maxillæ short .... **Lycosidæ.**

b^{13}. Mandibles weak, weakly toothed; labium and maxillæ long .... **Oxyopidæ.**

b^9. Claws 2; ungual tufts present.

a^{14}. Anterior spinners wide apart at base .... *Gnaphosidæ.*

b^{14}. Anterior spinners close together at base.

a^{15}. Anterior median eyes enormously large; eyes of posterior line forming a square on sides of head .... *Attidæ.*

b^{15}. Eyes more normal in size and position.

a^{16}. Mandibles prominent, strongly toothed; 3rd and 4th legs not much shorter than 1st and 2nd .... **Clubionidæ.**

b^{16}. Mandibles weak, weakly toothed; 3rd and 4th legs much shorter than 1st and 2nd .... *Thomisidæ.*

Family ERESIDÆ.

Small or medium-sized robust Spiders, with the cephalic region of the carapace wide and usually high; the clypeus low; the four median eyes forming a small quadrangle narrower in front than behind, the anterior lateral eye on the side of the head, the posterior lateral far removed from the rest of the eyes and situated high up on the posterior portion of the head; the mandibles flattish in front, with fang-groove scarcely toothed; maxillæ inclined obliquely inwards; legs strong, weakly spined, with three claws; abdomen oval; spinners with large cribellum.

Distribution. Central and Southern Europe; Western Asia, China; Africa; India, Ceylon, and Burma.

One Indian genus.

Genus **STEGODYPHUS**, Simon.

Stegodyphus, *Simon, Ann. Soc. Ent. Fr.* (5) iii. p. 336, 1873; *id. Hist. Nat. Araign.* i, p. 253, 1892.

Characters and distribution as above.

Type, *S. lineatus*, Latr.

The species of this genus live on bushes, where they spin either a large sheet-like web accompanied by a tubular retreat, or a large saccular nest in which many individuals live together.

Synopsis of Indian Species.

Males.

a. Anterior legs thick, their tibiæ nearly as high as long .... *S. tibialis*, p. 209.
b. Anterior legs not thick, their tibiæ more than twice as long as high.
  *a*¹. 2nd, 3rd, and 4th legs entirely red; 1st black in its basal, red in its distal half. . *S. mirandus*, p. 209.
  *b*¹. All the legs alike, banded.
    *a*². Total length about 12 mm. .... *S. pacificus*, p. 209.
    *b*². Total length about 6 mm. .... *S. sarasinorum*, p. 209.

Females.

a. Upper side of abdomen a uniform golden yellow .... *S. socialis*, p. 209.
b. Upper side of abdomen clouded or banded with black.
  *a*¹. Carapace clothed with olive-black hairs; abdomen not banded .... *S. mirandus*, p. 209.
  *b*¹. Carapace clothed with greyish-white hairs; abdomen banded.
    *a*². About 20 mm. in length; mandibles whitish .... *S. pacificus*, p. 209.
    *b*². About 10 mm. in length; mandibles darker .... *S. sarasinorum*, p. 209.

208. **Stegodyphus mirandus**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 750, 1899.

♀. *Colour*: carapace and limbs blackish, clothed with olive-black hairs; hairs on sternum and coxæ paler; abdomen bronze-black above, a rich golden red at the sides and below, with the spinners black.

♂. Uniformly black all over, with exception of the 2nd, 3rd, and 4th legs and tibia, protarsus, and tarsus of 1st leg, which are bright yellowish red.

Measurements in mm.—♀. Total length 20, carapace 8, 1st leg 20. ♂. Total length 12, carapace 6, 1st leg 19.

Loc. Western India: Bombay, Bundup (*Phipson*); Uran (*Aitken*); Poona Ghats (*Wroughton*).

209. **Stegodyphus pacificus**, sp. n.

♀. As large as the preceding. *Colour*: integument yellowish red, clothed with greyish hairs; legs banded with black; abdomen with a pair of irregular longitudinal blackish bands above and at the sides, black below, with a yellow band on each side; mandibles black at tip.

♂. Legs less strongly banded; abdomen pale below, ornamented laterally with short transverse reddish stripes.

Measurements in mm.—♀. Total length 20, carapace 10, 1st leg 23. ♂. Total length 12, carapace 6, 1st leg 21.

Loc. Western India: Eastern Khandesh (*Madan*); Eastern district of Poona (*Wroughton*).

210. **Stegodyphus sarasinorum**, *Karsch, Berl. ent. Zeits.* xxxvi, p. 275, pl. x, fig. 4, 1892.

♀. Much smaller than the preceding, which it closely resembles in colour but has the mandibles clothed with olive-black hairs. ♂. Much smaller than that of *S. pacificus*, the mandibles covered with olive hairs; palpal organ relatively larger.

Fig. 65 — *Stegodyphus sarasinorum*, ♀, × 2.

Measurements in mm.—♀. Total length 10, carapace 4, 1st leg 9·5. ♂. Total length 6, carapace 3, 1st leg 9.

Loc. Ceylon: Peradeniya (*Sarasin, Freeman*), Palode (*Yerbury*). India: Madatory, Ponmudi and Trivandrum in Travancore (*Ferguson*); Bangalore (*Staunton*); Chingleput (*Jambunathan*); Bilaspur, E. Khandesh (*Madan*); Poona (*Wroughton*); Uran (*Aitken*).

It is no doubt this species or the preceding that Simon by mistake records as *Stegodyphus gregarius*, O. P. Cambr., from Guzerat.

211. **Stegodyphus socialis**, sp. n.

♀. *Colour*: carapace black, with lateral border and cephalic region clothed with grey hairs; mandibles black, with a transverse

band of yellowish-grey hairs in the upper half; legs olive-brown, indistinctly banded with grey; abdomen golden yellow above and at sides, thickly mottled with black below.

Measurements in mm.—Total length 13, carapace 7, 1st leg 13.

Loc. S. India: Bangalore (*Staunton*).

212. **Stegodyphus tibialis**, *O. P. Cambridge, A. M. N. H.* (4) iii, p. 71, t. vi, figs. 70, 71, 1869 (Eresus).

♂. *Colour*: carapace black, with broad yellow marginal band; abdomen brownish black, the under side and anterior and posterior ends of upper side thickly covered with yellow hairs; legs blackish, the three posterior pairs banded above. Structurally differing from the previously described males in having the femur, patella, and especially tibia of the anterior legs thick and furnished with long black hairs, the height of the tibia being more than half its length.

Total length about 8 mm.

Loc. S. India: Mysore. Burma: Minhla (*Comotto*).

Family PSECHRIDÆ.

Medium-sized, cribellate Spiders with long and slender *legs*, the anterior two pairs being much longer than the posterior two, and all of them furnished with ungual tufts and 3 claws; the superior claws are strongly toothed. *Head* moderately elevated; eyes in two transverse lines; clypeus high. *Mandibles* strong and short, toothed below. *Abdomen* oval or cylindrical. *Cribellum* large.

Distribution. Ranging from Ceylon and India over the Indo- and Austro-Malayan area.

Sedentary Spiders spinning large sheet-like webs.

The two Indian genera may be diagnosed as follows:—

a. Head narrower, ocular quadrangle longer than wide .... PSECHRUS, p. 210

b. Head broader, ocular quadrangle square .... FECENIA, p. 212.

Genus PSECHRUS, Thorell.

Psechrus, *Thorell, Ann. Mus. Genova,* xiii, p. 170, 1878; *Simon, Hist. Nat. Araign.* i, p. 226, 1892.

Carapace with cephalic region narrower, more prominent anteriorly; *eyes* of anterior line procurved, medians smaller than laterals, of posterior line recurved, considerably behind the anterior line, quadrangle longer than wide.

Type, *P. argentatus*, Dol.

Distribution. India and Ceylon to New Guinea.

Synopsis of Indian Species

a. Cephalic region of carapace elevated, with ocular region prominent . . . . *P. alticeps*, p. 211.
b. Cephalic region not elevated; ocular region not prominent.
  a[1]. 1st leg about six times as long as carapace . *P. torvus*, p. 211.
  b[1]. 1st leg about five times as long as carapace . *P. ghecuanus*, p. 211.

213. **Psechrus torvus**, *O. P. Cambridge, Jour. Linn. Soc., Zool.* x, p. 376, pl. xi, 1869 (Tegenaria); *Simon, Hist. Nat. Araign.* i, p. 224, figs. 173 & 175, 1892 (Psechrus).

Colour: carapace and legs yellowish brown, the former with broad pale band on each side, the latter variegated with black; abdomen silvery above, variegated with dark stripes and spots, rich brown below, with a narrow median white line. *Carapace* not strongly elevated in front; ocular area not prominent; *eyes* of posterior line a little recurved, of anterior strongly procurved, the laterals nearly twice the diameter of the medians, lower edge of

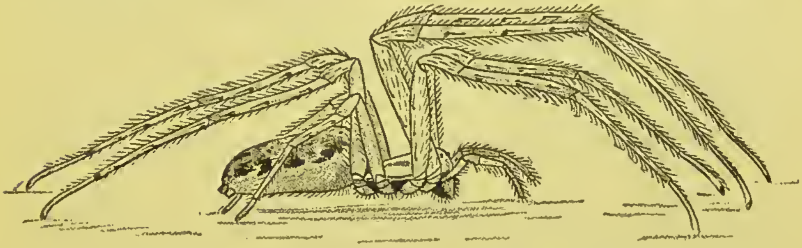

Fig. 66.—*Psechrus torvus*, ♀, × 2.

latter almost on a level with centres of former. *Legs* long and strong, 1st about six times as long as carapace. *Abdomen* ovally elongate.

♂. Smaller and longer legged than female; tibia of palp armed with short hairy apophysis; tarsus about twice as long as tibia.

Measurements in mm.—♀. Total length 20, carapace 9, 1st leg 54, 4th 43.

Loc. Ceylon: Pusselawa, Matale (*Sarasin*); Punduloya (*Green*); Peradeniya (*Freeman*), &c.

214. **Psechrus ghecuanus**, *Thorell, Ann. Mus. Genova*, xxxvii, p. 265, 1897.

Allied to *P. torvus*, but apparently darker in colour, with the legs densely ringed with black. *Eyes* of anterior line nearly straight. *Legs* shorter, 1st only about five times as long as the carapace.

Measurements in mm.—Total length 20, carapace 7·75, 1st leg 40, 4th 36.

Loc. Upper Burma: Karennee (*Fea*).

215. **Psechrus alticeps**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 751, 1899.

♀. Differs from both the preceding species in having the head elevated and the ocular region prominent; eyes of anterior line more

strongly procurved than in *P. torvus.* *Legs* much longer than in the latter, 1st leg only a little less than eight times as long as carapace. *Abdomen* long and subcylindrical.

Measurements in mm.—Total length 15, carapace 6·5, 1st leg 49, 4th 38.

Loc. Travancore: Ponmudi and Trivandrum (*Ferguson*).

Genus FECENIA, Simon.

Fecenia, *Simon, Bull. Soc. Ent. Fr.* (6) vii, p. cxciv, 1887; *id. Hist. Nat. Araign.* i, p. 226, 1892.

Differs from *Psechrus* in having the head wider, more convex above, and more rounded in front; the ocular area wider, the anterior medians larger than the laterals, the eyes of posterior line straight, and the ocular quadrangle about square.

Type, *F. angustata*, Thorell.

Distribution. S. India to the Solomon Islands.

The two British Indian species may be diagnosed as follows:—

a. 1st leg in female six times as long as carapace; vulva divided .... *F. travancoria*, p. 212.
b. 1st leg in female five times as long as carapace; vulva undivided .... *F. cylindrata*, p. 212.

216. **Fecenia travancoria,** *Pocock, Journ. Bom. N. H. Soc.* xii, p. 750, 1899.

♀. *Colour*: carapace clothed with ashy-grey hairs; legs with yellowish hairs, femora dark apically, patellæ dark, tibia of 3rd and 4th pairs biannulate; abdomen greyish yellow above, black below with a triangular yellow patch; yellow round vulva and in front of spinners. *Carapace* with eyes of posterior line slightly procurved, medians separated by a space exceeding twice their diameter. *Legs* long, first pair about six times as long as carapace. *Abdomen* not quite twice as long as wide. *Vulva* marked with two pits separated by a high longitudinal keel.

Measurements in mm.—♀. Total length 13, carapace 5·3, 1st leg 34.

Loc. S. India: Madatory in Travancore (*Ferguson*).

217. **Fecenia cylindrata,** *Thorell, Spiders of Burma,* p. 64, 1895; *id. Ann. Mus. Genova,* xxxvii, p. 263, 1897.

♀. Distinguishable from the preceding by having the patellæ pale, the eyes of the posterior line lightly recurved, the medians less than twice their diameter apart, the 1st leg about five times as long as carapace, the abdomen more than twice as long as wide, the cribellum undivided, and the vulva impressed with a deep undivided pit.

♂. Smaller than female, 1st leg about eight times as long as carapace.

Length of ♀ from 10 to 15 mm.

Loc. Burma: Tharrawaddy and Reef Island in the Tavoy River (*Oates*); Bhamo and Palon (*Fea*).

Family ARGYOPIDÆ.

(=*Epeiridæ* of most recent authors.)

Sedentary Spiders spinning webs composed of radiating and concentric threads.

Carapace with clypeus low; lateral eyes typically close together, remote from the median quadrangle and situated at the sides of the head. *Mouth-parts* manducatory; mandibles powerful, freely movable, with strongly toothed fang-groove; maxillæ not inclined on the labium. *Legs* not scopulate, 3 claws; tarsi furnished apically with "spurious claws" in the form of thickened serrate bristles. *Abdomen* large, but variable in form. *Spinners* subequal, short, forming a compact cluster; colulus present.

Distribution. Cosmopolitan.

Synopsis of the principal Indian Genera.

a. Head conical in front, lateral eyes wide apart .... POLTYS, p. 235.
b. Head truncate in front, lateral eyes nearer together.
  *a*¹. Abdomen hard, armed with 6 marginal spines .... GASTERACANTHA, p. 231.
  *b*¹. Abdomen softer, not armed with marginal spines.
    *a*². Head very high, abruptly elevated and strongly tubercular .... CÆROSTRIS, p. 230.
    *b*². Head lower, at most gradually elevated.
      *a*³. Mandibles long, armed with many teeth .... TETRAGNATHA, p. 214.
      *b*³. Mandibles short, armed with a few teeth.
        *a*⁴. Carapace with about 4 symmetrically arranged tubercles; abdomen very broad, multitubercular.................. ORDGARIUS, p. 230.
        *b*⁴. Carapace mostly smooth, rarely with 2 tubercles (*Nephila*) or irregularly tubercular.
          *a*⁵. Abdomen wider than long, leathery, with large sigilla above .... CYRTARACHNE, p. 228
          *b*⁵. Abdomen not wider than long, sigilla small.
            *a*⁶. Eyes of posterior line strongly procurved .... ARGYOPE, p. 220.
            *b*⁶. Eyes of posterior line not or scarcely procurved.
              *a*⁷. Abdomen flat, with sharply defined lateral edges .... HERENNIA, p. 219.

b^7. Abdomen convex, with rounded edges.	
a^8. Maxillæ long, very narrow at base, expanded and angular at apex	ARGYROEPEIRA, p. 215.
b^8. Maxillæ short and thick.	
a^9. Legs long, protarsi and tarsi longer than patellæ and tibiæ....	NEPHILA, p. 217.
b^9. Legs shorter, protarsi and tarsi shorter than patellæ and tibiæ.	ARANEUS, p. 223.

Genus **TETRAGNATHA**, Latreille.

Tetragnatha, *Latreille, Nouv. Dict. d'Hist. Nat.* xxiv, p. 135, 1804; *Simon, Hist. Nat. Araign.* i, p. 723, 1894.

Mandibles and *maxillæ* long or very long, projecting, the former armed with many teeth, fang long. *Legs* very long and slender. *Abdomen* long, subcylindrical, the genital aperture behind the stigmata. No vulva in ♀.

Type, *T. extensa*, Linn.

Distribution. Tropical, temperate, and subarctic countries.

These Spiders spin their webs on plants overhanging water, and when at rest remain with the legs extended forwards and backwards in a line with the body.

Many species, very similar in general appearance and habits, are represented in the Indian fauna. The following three wide-ranging forms may be regarded as representative types:—

a. Ocular quadrangle much narrower in front than behind	*T. gracilis*, p. 214.
b. Ocular quadrangle not narrower in front than behind.	
a^1. Fang (in ♀) strongly sinuous, armed in its basal half with two very strong teeth	*T. geniculata*, p. 215.
b^1. Fang (in ♀) not strongly sinuous, armed with only two small teeth	*T. mandibulata*, [p. 215.

218. **Tetragnatha gracilis**, *Stoliczka, J. A. S. B.* xxxviii, pt. 2, p. 244, t. xix, fig. 2, 1869 (Meta) ceylonica, *O. P. Cambr. Jour. Linn. Soc., Zool.* x, p. 394, t. xiii, fig. 83, 1870: latifrons, *Thorell, Ann. Mus. Genova,* x, p. 434, 1877 (Tetragnatha).

♀. *Carapace* with lateral eyes prominent; ocular quadrangle much wider behind than in front. *Mandibles* and *fang* relatively short; fang uniformly curved, armed with a small tooth beneath at base.

♂. Mandibles much longer and armed apically with two long spiniform teeth, one superior and one internal.

Total length 10 mm.

Loc. Ceylon. India: Chingleput (*Jambunathan*), Uran (*Aitken*), Dekkan (*Simon*), Calcutta (*Stoliczka*). Burma: Moulmein (*Oates*), Bhamo (*Fea*). Andamans, Celebes, &c.

219. **Tetragnatha geniculata,** *Karsch, Berl. ent. Zeits.* xxxvi, p. 286, 1892.

Carapace with posterior lateral eyes not prominent; ocular quadrangle only slightly narrower in front. *Mandibles* long; fang strongly geniculate in its distal half, armed near the base with two strong teeth, one inferior, the other external, more basal and projecting forwards.

Total length 15 mm.

Loc. Ceylon (*Sarasin*): Trincomali (*Yerbury*). India: Uran (*Aitken*), Poona Ghats (*Wroughton*).

220. **Tetragnatha mandibulata,** *Walck. Ins. Apt.* ii, p. 211, 1837: minatoria, *Simon, Ann. Soc. Ent. Fr.* (5) vii, p. 83, 1877: leptognatha, *Thorell, Ann. Mus. Genova,* x, p. 441, 1877.

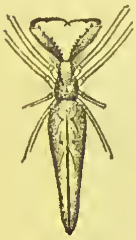

Fig. 67. *Tetragnatha mandibulata,* ♀. (Legs abbreviated.)

♀. *Eyes* more widely separated than in *T. geniculata.* *Mandible* with fang not strongly geniculate, lightly sinuous, armed with two small teeth, one beneath at the base, the other on the inner side in the basal half.

♂. Fang evenly curved at base, straightish, unarmed; mandible armed above with one shortish apical spiniform tooth.

Total length about 13 mm.

Loc. Burma: Rangoon (*Oates*), Shwegoo Myo (*Fea*). Nicobar Is.; Indo- and Austro-Malaysia.

Genus ARGYROEPEIRA, Emerton.

Argyroepeira, *Emerton, Tr. Conn. Acad.* vi, p. 331, 1885; *Simon, Hist. Nat. Araign.* i, p. 736, 1894.

Distinguishable from the succeeding genera by having the *maxillæ* long, narrow at the base, dilated, and externally angled at the apex, and by the presence of one row or more of bristles on the outer side of the *femur* of the 4th leg. The *abdomen* is ornamented with bands or spots of silvery pigment.

Type, *A. hortorum*, Hentz.

Distribution. Tropical and subtropical countries.

The following four may be regarded as representative types of the many species of this genus that inhabit British India:—

a. Anterior end of abdomen conically elevated .. *A. fastigata*, p. 216.
b. Anterior end of abdomen not conically elevated.
  a^1. Posterior end of abdomen conically produced .... *A. celebesiana*, p. 216.
  b^1. Posterior end of abdomen not conically produced.
    a^2. Tibia of 4th leg plumose .... *A. tessellata*, p. 216.
    b^2. Tibia of 4th leg not plumose .... *A. ventralis*, p. 216.

221. **Argyroepeira fastigata,** *Simon, Ann. Soc. Ent. Fr.* (5) vii, July 1877, p. 79, t. iii, fig. 10: elegans, *Thorell, Ann. Mus. Genova*, x, p. 416, 1877, Oct.–Dec. (Meta).

Carapace and *legs* pale, the latter banded with dark stripes: tibia of 4th pair thickly hairy in its distal half. Lateral *eyes* widely separated from medians. *Abdomen* with its fore part elevated into a conical prominence; posterior extremity forming an obtuse angle above the spinners. Male minute.

Total length (♀) 8 mm.

Loc. Ceylon: Trincomali (*Yerbury*). Burma: Tavoy (*Moti Ram*), Shwegoo Myo (*Fea*), Tharrawaddy and Rangoon (*Oates*). Also Philippine Islands, Celebes, &c.

222. **Argyroepeira tessellata,** *Thorell, Ann. Mus. Genova*, xxv, p. 135, 1887.

♀. Nearly allied to the preceding, but with the anterior extremity of the abdomen rounded, not elevated; the lateral eyes not so far from the medians; and the ventral surface of the abdomen dark, with a pair of clearly defined silver bands.

Total length 9 mm.

Loc. Burma: Shwegoo Myo (*Fea*); Tenasserim (*Oates*).

223. **Argyroepeira celebesiana,** *Walck. Ins. Apt.* ii, p. 222, 1837: decorata, *Blackwall, A. M. N. H.* (3) xiv, p. 44, 1864 (Tetragnatha): angustata, *Stoliczka, J. A. S. B.* xxxviii, pt. 2, p 241, t. xx, fig. 7, 1869 (Nephila).

Lateral *eyes* still nearer to the medians than in *A. tessellata*; colouring of ventral surface of abdomen as in the latter. Anterior extremity of *abdomen* low as in *A. tessellata*, but furnished with two low shoulder-tubercles; posterior end of abdomen produced into a conical caudal process.

Total length 8–10 mm.

Loc. Ceylon (*Sarasin, Cambridge*). India: Ootacamund (*Hampson*); Poona Ghats (*Wroughton*); Calcutta (*Stoliczka*). Burma: Bhamo (*Fea*); Tharrawaddy, Rangoon (*Oates*). Eastwards as far as Celebes, &c.

224. **Argyroepeira ventralis,** *Thorell, Ann. Mus. Genova*, x, p. 423, 1877 (Meta).

Allied to *A. tessellata*, but with the *eyes* of the posterior line

closer together; the *abdomen* less definitely banded, more irregularly clouded with blackish marks, and the tibiæ of the 4th leg not plumose.

Total length 7 mm.

Loc. Burma: Shwegoo Myo (*Fea*); Tharrawaddy, Rangoon, Double Island, and Tenasserim (*Oates*). Also Celebes.

Genus **NEPHILA**, Leach.

Nephila, *Leach, Zool. Misc.* ii, p. 133, 1815; *Simon, Hist. Nat. Araign.* i, p. 755, 1894.

Carapace with cephalic region convex, generally armed posteriorly with two tubercles; ocular quadrangle nearly square or slightly narrower in front. *Legs* very long, spinulose, with protarsi longer than tibiæ and patellæ. Female with vulva not or weakly developed. Male relatively minute, with palpus simple.

Type, *N. maculata*, Fabr.

Distribution. Tropical countries of the world.

Synopsis of Indian Species.

a. Legs short, 1st about four times as long as carapace .... *N. malabarensis*, p. 219.
b. Legs long, 1st about six times as long as carapace.
  a^1. A strong conical tubercle behind labium . *N. imperialis*, p. 218.
  b^1. At most a low elevation behind labium.
    a^2. Abdomen high at its posterior end above the spinners .... *N. clavata*, p. 218.
    b^2. Abdomen low at its posterior end.
      a^3. Legs black; abdomen spotted with yellow .... *N. maculata*, p. 217.
      b^3. Legs mostly red; abdomen less varied .... *N. kuhlii*, p. 218.

225. **Nephila maculata**, *Fabr. Ent. Syst.* ii, p. 425, 1793 (Aranea); *Thorell, Ann. Mus. Genova,* xvii, p. 145, 1881; *id. op. cit.* xxv, p. 149, 1887, with synonymy (Nephila).

♀. *Colour*: cephalothorax and its appendages black, coxæ of legs and proximal half of palpus yellow; carapace covered with silky yellow pubescence; abdomen olive-brown, ornamented below with yellow spots and above with a pair of longitudinal yellow lines and a transverse yellow band in front. *Carapace* smooth, with a pair of sharp tubercles. *Sternum* nearly flat behind labium. *Legs* very long, femur of 1st nearly twice as long as carapace, 1st leg about six times as long. *Abdomen* long.

Measurements in mm.—Total length 37, carapace 12, 1st leg 72, 4th 64.

Loc. Ceylon: Peradeniya (*Sarasin, Freeman*), Trincomali (*Yer-*

bury). India: Tinnevelly (*Barber*), Trivandrum (*Ferguson*), Ootacamund (*Hampson*), Kanara (*Millet*), Dehra Dun (*Oldham*), Darjiling (*Dendy*). Burma: Tharrawaddy, Tounghoo, Rangoon, Tenasserim, &c. (*Oates & Fea*); Mergui (*Anderson*). Nicobar Islands; thence eastwards to China and Australia.

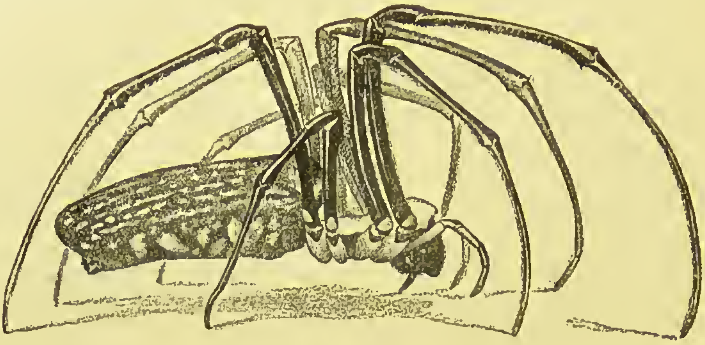

Fig. 68.—*Nephila maculata*, ♀, nat. size.

226. **Nephila kuhlii**, *Doleschall, Verh. Nat. Vereen. Nederland. Indië*, v. no. 5, p. 27, t. ix, fig. 7, 1859.

♀. Distinguishable from *N. maculata* by having the legs red with the exception of the patellæ, protarsi, tarsi, and the extremities of the femora and tibiæ, which are black; abdomen more uniformly coloured.

Total length up to about 40 mm.

Loc. N. India: Darjiling (*Dendy*). Burma: Bhamo (*Fea*). Thence eastwards to Celebes.

227. **Nephila imperialis**, *Doleschall, Nat. Tijdschr. Nederland. Indië*, xiii, p. 413, 1857 (Epeira); *Thorell, Spiders of Burma*, p. 159, 1895, with synonymy (Nephila).

♀. Resembling *N. maculata* in size and length of legs; the legs and palpi, including the coxæ, not so black, the sternum with lateral yellow spots, and the abdomen less boldly striped and spotted. *Sternum* with a large conical tubercle behind labium.

Total length 26 to 42 mm.

Loc. Burma: Rangoon and Tharrawaddy (*Oates*). Also occurs in the Indo- and Austro-Malayan areas.

228. **Nephila clavata**, *L. Koch, Verh. z.-b. Ges. Wien*, xxvii, p. 741, 1877: limbata, *Thorell, Ann. Mus. Genova*, xxxix, p. 335, 1898.

♀. Smaller than the preceding species. *Colour*: carapace with yellow patch behind head and yellow border; sternum with median yellow band; anterior legs with yellow band round femora and tibiæ, rest of the femora yellowish brown, palpi black at tip; abdomen black below, varied with yellow lines and spots, with a

pink band behind which laterally spreads on to the sides of the abdomen; upper side yellow, with indistinct transverse fuscous stripes. *Carapace* and sternum without tubercles. *Legs* long and thin. *Abdomen* twice as long as broad, posteriorly much elevated above the spinners.

Measurements in mm.—Total length 17, carapace 5, 1st leg 34.

Loc. North-eastern India: Darjiling (*Wroughton*), Shillong (*Heaven*). Burma (*Fea*). Also Japan, China, Formosa.

229. **Nephila malabarensis**, *Walck. Ins. Apt.* ii, p. 103, 1837 (Epeira) *Thorell, Ann. Mus. Genova,* xxviii, p. 188, 1890 (Nephilengys).

♀. *Colour*: carapace black, scantily clothed with yellow hairs; legs yellowish, banded with black; sternum yellow; abdomen ornamented with two pairs of yellow spots below, greyish brown mottled with darker tints above. *Carapace* with head high, granular, without tubercles. No tubercle on *sternum*. *Legs* shorter, femur of 1st scarcely longer than carapace, the entire leg only about four times as long. *Abdomen* evenly oval, one-third longer than wide.

Measurements in mm.—Total length 22, carapace 10, 1st leg 38.

Loc. Ceylon: Punduloya (*Green*); Peradeniya, Jaffna (*Sarasin*); Trincomali (*Yerbury*). India: Madatory and Trivandrum (*Ferguson*); Ootacamund (*Hampson*). Burma: Tharrawaddy, Tenasserim, &c. (*Oates & Fea*). Nicobar Islands. Thence eastwards to Australia.

Genus **HERENNIA**, Thorell.

Herennia, *Thorell, Ann. Mus. Genova,* x, p. 70, 1877; *Simon, Hist. Nat. Araign.* i, p. 759, 1894.

Carapace flat; *eyes* not extending across the frontal area; quadrangle scarcely longer than wide; eyes of posterior line nearly straight. *Abdomen* coriaceous, flattish above, with sharply defined, often lobate lateral margins, impressed with radially arranged lines of spots. Male with simple palpus.

Type, *H. ornatissima*, Doleschall.

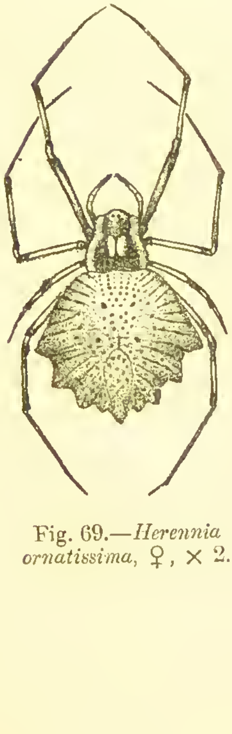

Fig. 69.—*Herennia ornatissima*, ♀, × 2.

230. **Herennia ornatissima**, *Doleschall, Verh. Nat. Vereen. Nederland. Indië,* v, no. 5, p. 32, 1859: multipuncta, *id. tom. cit.* p. 32, t. xi, fig. 1 (Epeira); *Thorell, Ann. Mus. Genova,* xxv, p. 166, 1887 (Herennia) (for synonymy).

♀. *Colour*: carapace blackish, with broadly yellow border and somewhat V-shaped median yellow patch, covered with white hair; legs yellowish, with apices of segments dark; sternum orange-yellow;

abdomen greyish yellow, speckled with black above, yellow with large median black spot below. *Carapace* flattish. *Legs* slender. *Abdomen* flattish, subpentagonal, lobate on each side posteriorly; impressed towards the margins with radially arranged rows of punctures.

Length about 15 mm.

Loc. Ceylon: Peradeniya (*Sarasin*), Kanthalai (*Yerbury*). India: Trivandrum (*Ferguson*), Ootacamund (*Hampson*). Burma: Tharrawaddy, Rangoon, Tenasserim, &c. (*Oates & Fea*). Thence eastwards into Austro-Malaysia.

Genus **ARGYOPE**, Sav.

Argyope, *Savigny, in Aud. & Sav. Egypte, Hist. Nat.* i, pt. 4, p. 121, 1809; *Simon, Hist. Nat. Araign.* i, p. 769, 1895.

Carapace flat; ocular quadrangle much longer than wide; *eyes* of posterior line very strongly procurved, the medians lying far behind the laterals. *Abdomen* truncate in front, swollen and frequently tubercular at the sides posteriorly.

Type, *A. lobata*, Pallas.

Distribution. Tropical and temperate countries.

Synopsis of Indian Species.

a. Abdomen with caudal process and large lateral lobes; carapace long.
- *a*¹. Coxæ and trochanters of 3rd and 4th legs unspined .... *A. lobata*, p. 221.
- *b*¹. Coxæ and trochanters of 3rd and 4th legs spined .... *A. arcuata*, p. 220.

b. Abdomen without caudal process and large lateral lobes.
- *a*². Abdomen pentagonal, broadest behind the middle, then abruptly narrowed. *A. pulchella*, p. 221, *A. undulata*, [p. 222, *A. anasuja*, p. 222, *A. taprobanica*, p. 222.
- *b*². Abdomen more evenly oval in outline.
  - *a*³. Abdomen ornamented above with dark patches formed of narrow black lines .. *A. æmula*, p. 223.
  - *b*³. Abdomen ornamented with bands of round spots .... *A. catenulata*, p. 223.

231. **Argyope arcuata**, *Simon, Ann. Mus. Genova*, xx, p. 343, 1884; *Thorell, op. cit.* xxv, p. 160, 1887.

♀. *Colour*: integument of carapace and legs blackish brown, legs indistinctly annulate; sternum with median yellow stripe; palpi yellow; abdomen rich yellow above, ornamented with three broad black bands; hairy covering silvery white. *Carapace* much longer than wide. *Legs*: coxæ and trochanters of 3rd and 4th pairs spinulose; femur of 3rd armed below with spines and spinules, of 4th with band of subequal spinules extending nearly to the base of the segment. *Abdomen* broad, furnished on each

side with three large and often two smaller tubercles and a median caudal process. *Vulva* with septum narrow, when viewed from below covering only the middle third of the cavity.

Total length 23 to 28 mm.

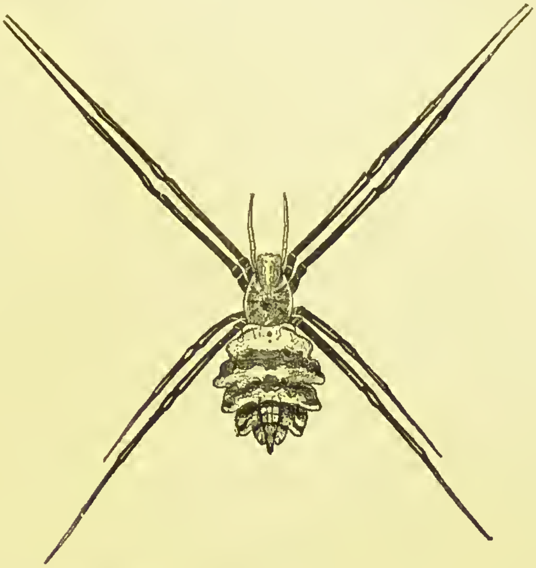

Fig. 70.—*Argyope arcuata*, ♀, nat. size.

Loc. Western and Southern India: Poona (*Wroughton*); E. Khandesh (*Madan*); Bangalore (*Staunton*). Burma: Minhla.

232. **Argyope lobata**, *Pallas, Spic. Zool.* i, pt. 9, p. 46, t. iii, fig. 14, 1772 (Aranea).

♀. Allied to the preceding, but paler in colour; legs very distinctly striped. Coxæ and trochanters of 3rd and 4th *legs* not spinulose below; band of spinules on femur of 4th more scanty and not spreading on to the basal third of the segment. Septum of *vulva* broader and shorter.

Total length about 25 mm.

Loc. India: Bellary and Wagra Karoor (according to Simon).

233. **Argyope pulchella**, *Thorell, Ann. Mus. Genova*, xvii, p. 74, 1881; *Simon, op. cit.* xx, p. 346, 1884; *Thorell, op. cit.* xxv, p. 158, 1887; *id. Spiders of Burma*, p. 162, 1895.

♀. *Colour*: carapace and legs deep reddish brown, the former thickly covered with silky white hair; palpi yellow; sternum yellow, black at sides; abdomen yellow or whitish above, ornamented with a large triangular olive-black patch behind, a transverse bar of the same colour in front, and two close-set narrow lines forming together a stripe in the anterior half, the dark

patches relieved by small white spots; ventral surface blackish, spotted, with a pair of yellow stripes running on each side from the epigastric fold; legs sometimes yellow and strongly banded with black, sometimes more uniformly dark. *Carapace* nearly as broad as long. *Abdomen* pentagonal, truncate in front, broadest behind the middle, then abruptly narrowed, scarcely lobed. Plate of *vulva* triangularly pointed, with thickened rim, each half of the cavity subcircular when seen from the side.

Length about 15 to 20 mm.

Loc. Burma: Rangoon, Tharrawaddy, Moulmein, &c. (*Oates & Fea*). Andaman Islands.

234. **Argyope undulata**, *Thorell, Ann. Mus. Genova,* xxv, p. 154, 1887; *id. Spiders of Burma,* p. 161, 1895.

Closely allied to *A. pulchella*, but with the anterior pale, trapezoidal area on the upper side of the abdomen completely divided by a single broad transverse olive-brown stripe. The inferior lamina of the *vulva* much more rounded posteriorly; the septum vertical with straighter sides, and when viewed from the side forming a right angle, and not a continuous circular curve, with the posterior portion of the ventral sclerite.

Total length 29 mm.

Loc. Burma: Tharrawaddy (*Oates*); Shwegoo (*Fea*).

235. **Argyope anasuja**, *Thorell, Ann. Mus. Genova,* xxv, p. 162, 1887: ornata, *Simon, op. cit.* xx, p. 347, 1884 (*not of Blackwall*).

Resembling the preceding, but with the ventral plate of the *vulva* scarcely produced in the middle posteriorly, the edge being more widely rounded, the thickened margin and the partition forming rather a T-shaped than a Y-shaped bar.

Total length about 11 mm.

Loc. India: Ramnad (*Fabre*), Chingleput (*Jambunathan*), Ootacamund (*Hampson*), Bangalore (*Staunton*), Násik (*Millet*), Karachi (*Simon*).

The following species based upon an immature specimen is indeterminable, though closely allied to *A. anasuja*:—

Argiope ornata, *Blackwall, A. M. N. H.* (3) xiv, p. 43, 1864 (Nephila).
Loc. East Indies.

236. **Argyope taprobanica**, *Thorell, Ann. Mus. Genova,* xxv, p. 163, 1887: versicolor, *Karsch, Berl. ent. Zeits.* xxxvi, p. 280, 1892 (*not of Doleschall*).

Closely allied to *A. pulchella*, but with the smooth edges of the spaces of the vulva thicker, and the spaces themselves less circular when seen from the side, and often furnished with a crescentic sclerite forming a secondary partition.

Total length 17 mm.

Loc. Ceylon: Kandy, Peradeniya (*Freeman*).

237. **Argyope æmula**, *Walck. Ins. Apt.* ii, p. 118, 1837 (Epeira); *Thorell, Ann. Mus. Genova*, xvii, p. 63, 1881 (Argiope) (for synonymy): trivittata, *Karsch, Berl. ent. Zeits.* xxxvi, p. 280, t. x, fig. 6, 1892 (dark variety).

Fig. 71. *Argyope æmula*, ♀, × 4/3.

Colour very much as in *A. pulchella*, but the black stripes and posterior black patch on the abdomen broken up into a series of transverse black lines by intervening broader pale bands. *Abdomen* about one-third longer than wide, oval, truncate in front, its sides evenly and lightly rounded; ventral plate of *vulva* longer than wide, sulcate, and mesially produced posteriorly with rounded apex.

Total length about 23 mm.

Loc. Ceylon: Trincomali (*Yerbury*), Punduloya (*Green*). India: Trivandrum (*Ferguson*), Nilgiri Hills (*Daly*), Poona Ghats (*Wroughton*), E. Khandesh (*Madan*), Balsar in S. Guzerat (*Wroughton*). Burma: Rangoon, Tharrawaddy, Bhamo (*Oates & Fea*). Nicobar Is.; Indo- and Austro-Malaysia.

238. **Argyope catenulata**, *Doleschall, Verh. Nat. Vereen. Nederland. Indië*, v, no. 5, p. 30, t. ix, fig. 1, 1859 (Epeira); *Thorell, Ann. Mus. Genova*, xxviii, p. 90, 1890 (synonymy): stellata, *Stolickza, J. A. S. B.* xxxviii, pt. 2, p. 234, t. xviii, fig. 6, 1869.

Allied to *A. æmula*, but differing considerably in colour, the posterior three-fourths of the upper side of the abdomen ornamented with transverse yellow stripes, frequently interrupted in the middle, the spaces between the bands occupied by transverse rows, each consisting of four subspherical pale spots, of which the median fuse together at the posterior end of the abdomen; the area occupied by the median spots covered with a continuous coating of silky hairs forming a band broad in front and narrowed behind.

Loc. Ceylon: Peradeniya (*Sarasin*). India: Wagra Karoor (*Simon*); Sunderbans (*Stoliczka*). Burma: Tharrawaddy, Moulmein (*Oates*). Nicobar Is.; Indo- and Austro-Malaysia.

Genus ARANEUS, Clerck.

Araneus, *Clerck, Svenska Spindlar*, p. 22, 1757.

Araneus+Cyrtophora, *Simon, Hist. Nat. Araign*, i, pp. 775 & 829, 1895.

Carapace convex; *eyes* of posterior line lightly or strongly recurved; quadrangle a little longer than wide; lateral eyes separated or in contact. *Legs* strong; protarsi shorter than tibiæ and patellæ. Female with distinct *vulva*. Male with complicated palpus.

Type, *A. diadematus*, Clerck.

Distribution. Tropical and temperate countries.

Synopsis of the principal Indian Species.

a. Ocular quadrangle parallel-sided or nearly so.
  a^1. Quadrangle square; abdomen higher behind than in front .... *A. laglaizei*, p. 224.
  b^1. Quadrangle much longer than wide; abdomen not higher behind.
    a^2. Abdomen furnished with 4 tubercles above in front .... *A. cicatrosus*, p. 226.
    b^2. Abdomen furnished with only 2 tubercles above in front.
      a^3. Abdomen produced posteriorly into a conical prominence .... *A. feæ*, p. 226.
      b^3. Abdomen evenly rounded behind .. *A. moluccensis*, p. 226.
b. Ocular quadrangle much narrower behind than in front.
  a^4. Anterior half of abdomen furnished on each side with two large prominences .. *A. citricola*, p. 226.
  b^4. Anterior half of abdomen at most furnished with a pair of shoulder prominences.
    a^5. Posterior extremity of abdomen bilobate. *A. exanthematicus*, [p. 227.
    b^5. Posterior end of abdomen not bilobate.
      a^6. Upper side of abdomen triangular; carapace granular.
        a^7. A large tubercle overhanging lateral eyes .... *A. dehaanii*, p. 225.
        b^7. No tubercle over lateral eyes .... *A. unicolor*, p. 225.
      b^6. Upper side of abdomen oval or heart-shaped; carapace smooth.
        a^8. Abdomen with a pair of large circular yellow spots .... *A. bilunifer*, p. 227.
        b^8. Abdomen without a pair of circular pale spots.
          a^9. Head narrower, flatter; distance between anterior median eyes almost half that between median and lateral .... *A. nauticus*, p. 228.
          b^9. Head broader, more convex; distance between anterior median eyes much less than half that between median and lateral .... *A. rumpfi*, p. 228.

239. **Araneus laglaizei**, *Simon, Ann. Soc. Ent. France*, (5) vii, p. 77, 1877; *Thorell, Ann. Mus. Genova*, xxviii, p. 167, 1890 (for synonymy) (Epeira).

Colour variable, pale or dark brown; legs distally banded; abdomen yellowish white above, strongly or weakly banded, blackish or greyish below, with two pairs of whitish spots on each side. *Carapace* with weak ocular tubercles; quadrangle almost square, slightly wider behind than in front; lateral eyes in contact. *Legs* scarcely spined. *Abdomen* heart-shaped, very broad in front, much elevated behind above the spinners, and often

prolonged into a longish subcylindrical tail. *Vulva* with scape stout at base, downcurled at apex.

Total length up to 10 mm.

Loc. Ceylon: Peradeniya (*Freeman*); Trincomali (*Yerbury*). India: Ootacamund (*Hampson*); Jaunsar, Thadyar, 2500 ft. (*Oldham*). Burma: Tounghoo, Tharrawaddy, Rangoon, Tenasserim, &c. (*Oates & Fea*). Indo- and Austro-Malaysia.

240. **Araneus unicolor**, *Doleschall, Nat. Tijdschr. Nederland. Indië*, xiii, p. 419, 1857; *Thorell, Spiders of Burma*, p. 171, 1895 (for synonymy) (Epeira).

Prevailing *colour* reddish brown, lightly infuscate on the upper side of the abdomen, yellow below and laterally. *Carapace* broad, coarsely granular or tubercular; *eyes* of posterior line very distinctly recurved; lateral eyes widely separated, quadrangle wider in front. *Legs* strong but short, at most weakly spined; anterior femora tubercular. *Abdomen* somewhat heart-shaped, broadly truncate in front, with large prominent shoulder-points, pointed behind, high and prominent above spinners. *Vulva* small, without scape.

Total length about 20 mm.

Loc. Ceylon. N.E. India, Nagá Hills. Burma: Tharrawaddy (*Oates*).

A. acrobalia, Thorell (Spiders of Burma, p. 173, 1895 (*Epeira*)), based upon an immature female from Tounghoo (*Oates*), is closely allied to this species.

241. **Araneus dehaanii**, *Doleschall, Verh. Nat. Vereen. Nederl. Indië*, v, no. 5, p. 33, t. ii, fig. 7, 1859; *Thorell, Ann. Mus. Genova*, xxviii, p. 125, 1890; *id. Spiders of Burma*, p. 170, 1895 (for synonymy) (Epeira).

Fig. 72.—*Araneus dehaanii*, ♀, ×4/3.

Colour: carapace reddish, blacker laterally, clothed with white hairs; legs and palpi blackish red, banded; abdomen dull yellowish brown laterally and below, variable above, the area between the shoulder-points and the extremity often deep reddish chocolate, yellow at the sides, sometimes with a few yellow spots in front; the yellow lateral portion sometimes broken up into a series of large yellow spots. *Carapace* granular above, with a conical tubercle on each side above the lateral eyes. *Abdomen* triangular, broad, with large sharp shoulder-points in front, pointed behind, and ending in three prominences set in a vertical series. *Vulva* small, with very stout scape.

Total length about 24 mm.

Loc. Ceylon: Trincomali (*Yerbury*). India: Kanara (*Millet*). Burma: Tharrawaddy, Bhamo, Tenasserim, &c. (*Oates & Fea*). Indo- and Austro-Malaysia.

242. **Araneus moluccensis**, *Doleschall, Nat. Tijdschr. Nederland. Indië*, xiii, p. 418, 1857; *Thorell, Ann. Mus. Genova*, xiii, p. 40, 1878 (for synonymy) (Epeira).

Colour: carapace and limbs blackish, the former, and to a less extent the latter, clothed with whitish hairs; coxæ mostly yellow, sternum with yellow line; abdomen yellow in front above, rest of the dorsal surface thickly spotted and lined with yellow on a black ground; blackish below. *Carapace* flattish; ocular quadrangle parallel-sided, much longer than wide; *eyes* of posterior line nearly straight, lateral eyes narrowly separated. *Legs* strong, long, scarcely spined, furnished with stiff bristles. *Abdomen* evenly oval, with two distinct shoulder-points in front. *Vulva* without scape.

Total length 24 mm.

Loc. Ceylon: Kellar (*Yerbury*), &c. India: Trivandrum (*Ferguson*), Nilgiri Hills (*Daly*). Burma: Tharrawaddy, Rangoon, Moulmein (*Oates & Fea*). Indo- and Austro-Malaysia.

243. **Araneus feæ**, *Thorell, Ann. Mus. Genova*, xxv, p. 173, 1887; *id. Spiders of Burma*, p. 170, 1895 (Euetria).

Allied to *A. moluccensis*, but smaller and paler; carapace and legs ochre, femora banded above longitudinally; abdomen whitish above, with median longitudinal black band broken up by paler markings and bordered with white; sides ornamented with white bands; lower surface black, spotted and bordered with white. *Carapace* with eyes of posterior line distinctly procurved; laterals in contact. *Legs* long and slender, armed with slender spines. *Abdomen* longer, narrower, more prominent posteriorly above spinners.

Total length 13 mm.

Loc. Burma: Tharrawaddy, Rangoon (*Oates*), Bhamo (*Fea*).

244. **Araneus cicatrosus**, *Stoliczka, J. A. S. B.* xxxviii, p. 242, t. xx, fig. 5, 1869: salebrosa, *Thorell, Ann. Mus. Genova*, xiii, p. 48, 1878 (Epeira): adspersata, *Karsch, Berl. ent. Zeits.* xxxvi, p. 284, t. x, fig. 8, 1892 (Meta).

Coloured much as in *A. feæ*, but with the carapace banded with black, the legs thickly spotted with black, and the median abdominal band restricted to the posterior third of the dorsal surface. *Carapace* less flat; *eyes* of posterior line slightly recurved; laterals very distinctly separated. *Abdomen* furnished above in its anterior half with two pairs of conical erect tubercles arranged in a square.

Total length 6 mm.

Loc. India: Chingleput (*Jambunathan*), Kanara, Násik (*Millet*), Allahabad (*Ryves*); Calcutta (*Stoliczka*). Burma: Tharrawaddy, Moulmein (*Oates*). Indo- and Austro-Malaysia.

245. **Araneus citricola**, *Forskål, Descript. Anim. etc.* p. 86, 1775; *id. Icones rer. nat.* t. xxiv, fig. D, 1776 (Aranea); *Thorell, Spiders of Burma*, p. 172, 1895 (for synonymy) (Epeira).

Colour very variable, either uniformly flavous or blackish, legs obscurely banded; dorsal side of abdomen often black and bordered with a sinuous yellow band and marked in front in the middle line with a pair of close-set narrow pale stripes. *Carapace* convex, smooth; *eyes* of posterior line very strongly recurved; laterals widely separated. *Legs* short and strong. *Abdomen* oval, with large shoulder prominences, a deeply bifid posterior extremity, and a lateral prominence on each side just in front of the middle. *Vulva* without scape.

Fig. 73.—*Araneus citricola*, ♀, × 2.

Total length about 12 mm.

Loc. Ceylon (*Barnes*, *Cambridge*). India: Bangalore (*Staunton*); Chingleput (*Jambunathan*); Kanara (*Millet*). Burma: Rangoon, Tharrawaddy (*Oates*). Also Australia, Madagascar &c., Africa, and S. Europe.

246. **Araneus exanthematicus**, *Doleschall, Verh. Nat. Vereen. Nederland. Indië*, v, no. 5, p. 38, t. iii, fig. 3, 1859; *Thorell, Ann. Mus. Genova*, xiii, p. 57, 1878 (Epeira).

Nearly allied to *A. citricola*, but at once distinguishble by the absence of the submedian lateral prominence on the abdomen.

Total length about 10 mm.

Loc. Burma: Tounghoo (*Oates*). Indo- and Austro-Malaysia.

247. **Araneus bilunifer**, sp. n.

♀. Prevailing *colour* yellowish, legs distally infuscate and banded, sternum mesially blackish; abdomen yellowish grey, indistinctly variegated with darker markings, marked in front with a pair of large circular black-ringed yellow patches and some smaller irregular spots in front of them; median ventral area infuscate, with pale yellow band on each side. *Carapace* weakly granular; *eyes* of posterior line lightly recurved, medians almost in contact, lateral eyes visibly separated. *Legs* strong, spiny; protarsi of anterior pairs armed with many close-set spines from base to apex: tarsi spined. *Abdomen* broadly oval, with a pair of low shoulder-points. *Vulva* with scape much narrower than basal portion and closely in contact with it.

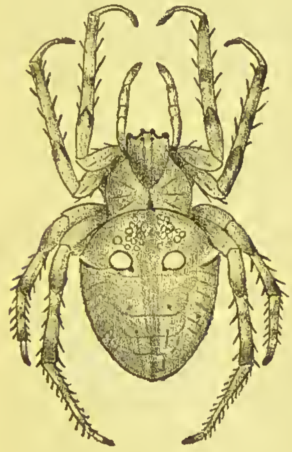

Fig. 74. *Araneus bilunifer*, ♀, × 2.

Total length 21 mm.

Loc. S. India: Chingleput (*Jambunathan*).

248. **Araneus nauticus**, *L. Koch, Ægypt. Abyssin. Arachn.* p. 17, t. ii, fig. 2, 1875: pullata, *Thorell, Ann. Mus. Genova*, x, p. 385, 1877; *id. op. cit.* xxviii, p. 148, 1890 (for synonymy) (Epeira).

Colour: carapace dark brown, with greyish hairs; legs strongly banded with black; sternum black with median pale line; abdomen black below with a pair of large pale spots, upper side varied with deep brown and grey, the latter typically forming a large median cross-shaped band. *Head* narrow, flattish, ocular tubercle prominent; *eyes* of anterior line not widely spaced, distance between medians noticeably exceeding half that between them and the laterals. *Abdomen* evenly heart-shaped, without shoulder-points, only a little longer than broad. *Vulva* with scape, not bent at right angles, without any notch between it and the basal portion.

Total length, ♀ (adult), from 7–15 mm.

Loc. India: Karachi (*Simon*); eastern district of Poona (*Irani*); Eastern Khandesh (*Madan*); Darjiling (*Dendy & Wroughton*). Burma: Rangoon, Tharrawaddy, Bhamo, &c. (*Oates & Fea*). All tropical countries.

249. **Araneus rumpfi**, *Thorell, Ann. Mus. Genova*, xiii, p. 296, 1878: hispida, *Doleschall, Verh. Nat. Vereen. Nederland. Indië*, v, no. 5, p. 33, 1859: decens, *Thorell, Ann. Mus. Genova*, x, p. 379, 1877 (preoccupied): rufofemorata, *Simon, Ann. Mus. Genova*, xx, p. 348, 1884 (Epeira).

♀. *Colour* and shape much as in *A. nauticus*; anterior femora reddish brown; head redder, more convex, broader, distance between anterior median eyes about one-third of distance between medians and laterals; lower side of abdomen more yellow, upper side variable, sometimes as in *A. nauticus*, sometimes yellowish with large anterior brown patch. *Vulva* with scape much longer, bent at right angles, separated posteriorly from the basal portion by a wide but shallow tubercular notch.

Total length from 10–15 mm.

Loc. Ceylon: Punduloya (*Green*); Trincomali (*Yerbury*). India: Chingleput (*Jambunathan*), Bangalore (*Staunton*), Ootacamund (*Hampson*), Poona (*Wroughton*), Wagra Karoor (*Fabre*), Karachi (*Simon*). Burma: Rangoon, Tharrawaddy, Bhamo (*Oates & Fea*). Indo- and Austro-Malaysia.

Genus **CYRTARACHNE**, Thorell.

Cyrtarachne, *Thorell, Eug. Resa, Arachn.* p. 10, 1868; *Simon, Hist. Nat. Araign.* i, p. 880, 1895.

Carapace convex, unarmed; median eyes not prominent, the quadrangle generally slightly wider than long; laterals contiguous. *Abdomen* wider than long, integument leathery, impressed in the middle and in front with large sigilla.

Type, *C. grubei*, Keys.
Distribution. Mediterranean, Ethiopian, Oriental, and Australian Regions.

Synopsis of Indian Species.

a. Abdomen not pointed behind, black with yellow lateral ring . . . . *C. cingulata*, p. 229.
b. Abdomen pointed behind, mostly yellow.
  *a*¹. Abdomen with black patch below; vulva triangular . . . . *C. inæqualis*, p. 229.
  *b*¹. Abdomen not black below; vulva quadrate . *C. raniceps*, p. 229.

250. Cyrtarachne raniceps, sp. n.

? Cyrtarachne perspicillata, *Karsch, Berl. ent. Zeits.* xxxvi, p. 278, 1892 (*not of Doleschall*).

♀. *Carapace* and abdomen ochre-yellow, scantily clothed with pale hairs; abdomen a brighter more lemon-yellow above, testaceous beneath, the shoulder prominences amber at the tip, partially surrounded at the base by darker and paler lines. *Abdomen* one-fourth wider than long, triangular, broadest in its anterior half, where it runs out laterally into a large smooth conical prominence, the area between the prominences tolerably even. *Vulva* with scape in the form of a short, narrow, subquadrate tubercle.

Length of abdomen 7 mm., width 9.

Loc. Ceylon (*Barnes*).

251. Cyrtarachne inæqualis, *Thorell, Spiders of Burma*, p. 201, 1895.

♀. Nearly allied to the preceding, but with the ventral surface of the abdomen black behind the epigastric fold, and the fore part of its lateral surface bulging out and furnished with a dark coloured patch beneath the conical prominence. Scape of *vulva* triangular at base, apically pointed.

Length of abdomen 8 mm., width 11.

Loc. Burma: Tounghoo and Tharrawaddy (*Oates*).

252. Cyrtarachne cingulata, *Thorell, Spiders of Burma*, p. 202, 1895

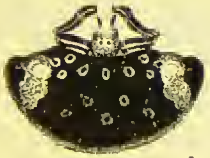

Fig. 75.—*Cyrtarachne cingulata*, ♀, × 2.

♀. *Carapace* and legs deep brown; abdomen black, with a broad yellow ring narrowly interrupted below round its lateral extremities. *Abdomen* twice as broad as long, widely rounded posteriorly. *Vulva* with sub-triangular scape.

Length of abdomen 5, width 10 mm.

Loc. Burma: Rangoon (*Oates*).

Genus **ORDGARIUS**, Keyserling.

Ordgarius, *Keyserling, in Koch, Arachn. Austral.* 1886, p. 114; *Simon, Hist. Nat. Araign.* i, p. 885, 1895.

Carapace convex, armed above with a few symmetrically placed tooth-like tubercles. *Abdomen* very large, wider than long, widely rounded laterally, tuberculate above.

Type, *O. monstrosus*, Keys.

Distribution. From India to Australia.

Synopsis of Indian Species.

a. Posterior end of abdomen rounded and tubercular.......................... *O. hobsoni,* p. 230.

b. Posterior end of abdomen conically produced and tubercular...................... *O. sexspinosus,* p. 230.

253. **Ordgarius hobsoni,** *O. P. Cambridge, P. Z. S.* 1877, p. 562, t. lvi, fig. 3 (Cyrtarachne).

♀. *Colour* a tolerably uniform dull brown, legs and palps yellow ringed with black, abdomen ornamented in front in the middle with a large yellow patch. *Carapace* armed behind with a pair of small tubercles and a large median conical tubercle, with a smaller one in front of it on the cephalic portion. *Legs* without spines. *Abdomen* broader than long, the anterior border emarginate; posterior extremity bluntly rounded, raised in front into a pair of large rounded protuberances, studded with larger and smaller rounded tubercles.

Fig. 76. *Ordgarius hobsoni,* ♀.

Total length of abdomen 9 mm., width 11·5.

Loc. Ceylon: Punduloya (*Green*). Bombay (*Hobson*).

254. **Ordgarius sexspinosus,** *Thorell, Bih. Sv. Vet.-Akad. Handl.* xx, pt. iv, p. 48, 1894 (Notocentria).

♀. Differing from the preceding in having the tubercles on the carapace very long and spiniform, and the abdomen furnished with a few low tubercles on the anterior prominence, with its posterior extremity produced into two upper and two lower conical processes, considerably overlapping the spinners.

Total length 6 mm.

Loc. Burma: Tharrawaddy (*Oates*).

Genus **CÆROSTRIS**, Thorell.

Cærostris, *Thorell, Eug. Resa, Arach.* p. 3, 1868; *Simon, Hist. Nat. Araign.* i, p. 834, 1895.

Carapace with thoracic portion low; cephalic portion strongly elevated, armed with a transverse row of six large tubercles, two

on the summit and two on each side; ocular quadrangle wider than long, narrowed in front. *Legs* strong, with tibiæ and protarsi flat and strongly sulcate. *Abdomen* large, high in front, irregularly tubercular.

Type, *C. mitralis*, Vinson.

Distribution. Ethiopian Region, Madagascar; Oriental Region.

255. **Cærostris paradoxa**, *Doleschall, Verh. Nat. Vereen. Nederland. Indië*, v, no. 5, p. 37, t. ix. fig. 11, and t. x. fig. 8, 1859 (Epeira); *Butler, P. Z. S.* 1879, p. 732, t. lviii, fig. 5 (Cærostris).

♀. *Colour*: integument of carapace and limbs black, carapace clothed laterally with yellow hairs, head and legs with greyish-brown hairs; femora blackish or deep steel-blue; tibiæ with band of yellow hairs in their basal half below; abdomen yellow-brown, clothed with silvery hairs in the middle in front, elsewhere with golden-brown hairs intermixed with stripes of velvety black; lower surface olive-black, reddish in middle.

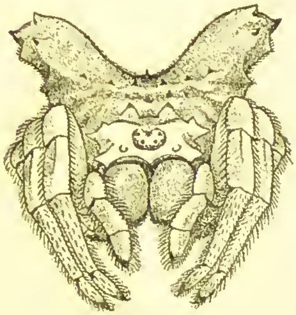

Fig. 77.
Cærostris paradoxa, × $\frac{4}{5}$.

Total length about 20 mm.

Loc. Ceylon: Trincomali (*Yerbury*), Punduloya (*Green*). Burma: Tharrawaddy, Rangoon, Tounghoo (*Oates*). Indo-Malaysia.

Genus **GASTERACANTHA**, Sund.

Gasteracantha, *Sundevall, Consp. Arachn.* p. 14, 1833; *Simon, Hist. Nat. Araign.* i, p. 845, 1895.

Carapace with thoracic portion low, cephalic portion elevated; ocular quadrangle narrower in front. *Abdomen* large, subquadrate, transversely oblong, or narrowed laterally; integument horny, impressed with large sigilla, and armed on each side with an anterior, a median, and a posterior spine; spinners encircled by a horny ring.

Type, *G. cancriformis*, Linn.

Distribution. Tropical countries of the world.

Synopsis of Indian Species.

a. No ventral tubercle in front of spinners on abdomen.
- *a*¹. Length of median spine only about equal to half the width of the abdomen ...... *G. hasseltii*, p. 233.
- *b*¹. Length of median spine at least as great as width of abdomen.
  - *a*². Median spines apically clavate ...... *G. remifera*, p. 233.

b^2. Median spines not clavate.
  a^3. Median spines less than twice the width of the abdomen.
    a^4. Median spine equalling width of abdomen … *G. sororna*, p. 233.
    b^4. Median spine nearly twice the width of the abdomen … *G. dalyi*, p. 232.
  b^3. Median spine slender, arcuate, more than twice as long as width of abdomen … *G. arcuata*, p. 232.
b. A ventral tubercle in front of spinners on abdomen.
  a^5. Anterior and median spines subequal, in contact except at the extremities … *G. geminata*, p. 233.
  b^5. Anterior and median spines widely separated.
    a^6. Summit of head elevated into a conical eminence; spines short … *G. brevispina*, p. 235.
    b^6. Summit of head not elevated into a conical process.
      a^7. Lateral and to a lesser extent posterior spines very broad at base, abruptly narrowed at apex … *G. unguifera*, p. 234.
      b^7. Lateral and posterior spines mostly evenly acuminate.
        a^8. Abdomen only about one-fourth wider than long, not laterally narrowed … *G. leucomelæna*, p. 235.
        b^8. Abdomen twice as wide as long, laterally narrowed … *G. frontata* and *G. diadesmia*, p. 234.

256. **Gasteracantha arcuata**, *Fabr. Ent. Syst.* ii, p. 425, 1793 (Aranea); *Thorell, Ann. Mus. Genova*, xxv, p. 223, 1887 (Plectana) (synonymy).

Colour: carapace, legs, &c. blackish, femora rather paler; abdomen yellow above, with marginal black antero-lateral band, black below and covered with yellow spots. *Abdomen* with anterior and posterior spines minute; median spines very long, slender, and arcuate, exceeding twice the width of the abdomen in the adult.

Measurements in mm.—Width of abdomen at base of anterior spines 8·8 mm., length 6·5, length of median spine 20.

Loc. Burma: Tharrawaddy (*Oates*), Shwegoo (*Fea*). Indo-Malaysia.

257. **Gasteracantha dalyi**, sp. n.

Allied to the preceding, but with the abdomen not margined with black above, the anterior and posterior spines larger and the median spine much shorter, less arcuate, and considerably less than twice as long as the width of the abdomen.

Width of abdomen 8·8 mm., length of median spine 15.

Loc. S. India: Yercaud in Shevaroy Hills (*Daly*).

258. **Gasteracantha sororna**, *Butler*, *Tr. Ent. Soc.* 1873, p. 155, t. iv, fig. 15.

♀. Closely allied to *G. dalyi*, but with the median spine slender, attenuate, and only equalling the width of the abdomen.

Width of abdomen 6·5 mm., length of median spine 6·5.

Loc. Madras (*Jerdon*).

259. **Gasteracantha remifera**, *Butler*, *Tr. Ent. Soc.* 1873, p. 154, t. iv, fig. 5: clavatrix, *Karsch*, *Berl. ent. Zeits.* xxxvi, p. 277, 1892 (Plectana) (*not of Walck.*).

At once recognizable from all the preceding by having the median spines much thinner in the middle than at the base and extremity, the latter being lightly clavate and abruptly narrowed

Fig. 78.—*Gasteracantha remifera*, ♀, × 2.

to a point at the extreme tip; anterior and posterior spines larger, the median spine a little exceeding the width of the abdomen.

Loc. Ceylon (*Thwaites*): Trincomali (*Yerbury*).

260. **Gasteracantha hasseltii**, *C. Koch*, *Arach.* iv, p. 29, t. cxvii, fig. 267, 1838 (Gasteracantha); *Thorell*, *Ann. Mus. Genova*, xxv, p. 224, 1887 (Plectana) (synonymy): propinqua, *O. P. Cambridge*, *P. Z. S.* 1879, p. 288, t. xxvii, fig. 16 (Gasteracantha).

Recognizable from the foregoing by having the median spines, which are typically attenuate, very short, their length hardly exceeding half the width of the abdomen; the remaining spines as long as in *G. remifera*.

Width of abdomen 8 mm., length of median spine 3·5.

Loc. N.E. India: Assam, Sikhim. Burma: Tharrawaddy, Rangoon, Shwegoo, Tenasserim, &c. (*Oates & Fea*).

261. **Gasteracantha geminata**, *Fabr. Suppl. Ent. Syst.* p. 292, 1798 (Aranea): rimata, *O. P. Cambridge*, *P. Z. S.* 1879, p. 282, t. xxvi, fig. 3 (Gasteracantha).

Colour: carapace, mandibles, and legs black, the latter annulate

with pale markings; sternum yellow; abdomen yellow above with two transverse black stripes, black below with yellow spots. *Abdomen* narrowed laterally, about twice as wide as long; the anterior and median spines longest, subequal, in contact at the base, diverging slightly at apex; posterior spines strongish.

Fig. 79.—*Gasteracantha geminata*, ♀.

Length of abdomen 5 mm., width 11 (not including spines).

Loc. Ceylon: Peradeniya, Matale (*Sarasin*), Trincomali (*Yerbury*). Southern India: Tinnevelly (*Barber*); Ootacamund (*Hampson*); Ramnad (*Fabre*); Madras (*Jambutnahan*).

262. **Gasteracantha frontata**, *Blackwall, A. M. N. H.* (3) xiv, p. 40, 1864; *Cambr. P. Z. S.* 1879, p. 283, t. xxvi, fig. 5; *Thorell, Spiders of Burma*, p. 210, 1895.

Colour and *form* much as in the preceding, but the anterior and median spines of the abdomen separated. *Abdomen* pale above or marked in front with a tolerably uneven black band, the yellow area in front of the stripe reaching to the base of the anterior spine. *Sternum* black with yellow spot; median spines short, narrower than mandibles, and nearly evenly narrowed from base to point, about twice as long as the posterior, which a little exceed the anterior.

Length of abdomen 6 mm., width 13.

Loc. Burma: Tharrawaddy, Tounghoo, Rangoon, Tenasserim (*Oates*). Siam.

263. **Gasteracantha diadesmia**, *Thorell, Ann. Mus. Genova*, xxv, p. 225, 1887.

Closely allied to *G. frontata*, but with the anterior yellow band not reaching the base of the anterior spines, and with the posterior half of the abdomen marked with a second transverse black stripe; median spine not thin and evenly attenuate, but thicker and with its anterior border distinctly swollen and convex in its distal half.

Total length of abdomen 7 mm., width 16.

Loc. Burma: Tharrawaddy (*Oates*); Bhamo, Shwegoo (*Fea*). Andaman and Nicobar Islands, &c.; also Penang and Siam.

264. **Gasteracanthaunguifera**, *Simon, J. A. S. B.* lviii, p. 336, 1889.

♀. Much smaller than the preceding. *Abdomen* granular and tolerably uniformly flavous above, about one-third wider than long; anterior border rather strongly convex, anterior spines small, acuminate; median spines much larger, with the basal portion exceedingly stout and distally expanded, then abruptly narrowed, the terminal portion normally slender and rising from the middle of the expanded end of the basal portion; posterior

spines also with basal portion stout, but not so abruptly narrowed as in the case of the median spines.

Length of abdomen 3 mm., width 4·5.

Loc. Himalayas: Jaunsar, Thadyar, 2600 ft. (*Oldham*).

265. **Gasteracantha leucomelæna**, *Doleschall, Verh. Nat. Vereen. Nederland. Indië*, v, no. 5, p. 42, t. xi, fig. 8, 1859 (Plectana leucomelas); *Thorell, Ann. Mus. Genova*, xxv, p. 232, 1887: annamita, *Simon, Act. Soc. L. Bord.* xl, p. 148, 1886.

Colour: carapace and mandibles black; legs yellow, with black bands; sternum yellow, with posterior black spot; upper side of abdomen whitish or yellow, with median black Y-shaped mark and a large black patch at base of spines, the patches sometimes uniting with the ends of the arms and with the stem of the Y to form transverse bars of black. Abdomen about one-third wider than long, not laterally attenuate, parallel-sided; the spines small, acuminate, the median and posterior subequal and much larger than the anterior.

Length of abdomen 5 mm., width 7.

Loc. Burma: Rangoon, Tharrawaddy, Tenasserim, &c. (*Oates, Fea*). Andaman and Nicobar Islands. Indo-Malaysia.

266. **Gasteracantha brevispina**, *Doleschall, Nat. Tijdschr. Nederland. Indië*, xiii, p. 423, 1857 (Plectana); *Thorell, Ann. Mus. Genova*, xxviii, p. 63, 1890: canningensis, *Stoliczka, J. A. S. B.* xxxviii, p. 248, t. xviii, fig. 1, 1869 (Gastracantha).

About the same size and much the same form as *G. leucomelæna*; head reddish laterally and rising in the middle into a conical prominence much more pronounced than in the preceding species. Abdomen a little wider than long, very variable in colour, sometimes the black, sometimes the yellow predominating; usually there is a large triangular black patch on each side and a pair of large yellow ocelliform spots near the middle; spines shorter, conical, the lateral and median not evenly acuminate, being very stout at the base and abruptly narrowed at the apex, somewhat as in *G. unguifera*.

Length of abdomen 5·5 mm., width 7.

Loc. Ceylon. India: Madras (*Jambunathan*); Uran (*Aitken*), Karachi (*Simon*), Dehra Dún (*Oldham*), Calcutta (*Stoliczka*). Burma: Moulmein, Tenasserim (*Oates, Fea*). Andaman and Nicobar Islands. Indo- and Austro-Malaysia.

Genus POLTYS, C. Koch.

Poltys, *C. Koch, Arachn.* x, p. 97, 1843; *Simon, Hist. Nat. Araign.* i, p. 892, 1895.

Carapace with cephalic region prominent, conical in front, ocular quadrangle square or a little wider in front; lateral eyes widely separated, the posterior remote from the rest. *Legs* of

anterior two pairs long, with tibiæ and protarsi curved, flat above. *Abdomen* large, high in front, usually irregularly tubercular at the margins.

Type, *P. illepidus*, C. Koch.

Distribution. Ethiopian, Oriental, and Australian Regions.

The two species described below may be diagnosed as follows:—

a. Ocular quadrangle wider in front than behind.. *P. illepidus*, p. 236.
b. Ocular quadrangle narrower in front than behind. *P. pannuceus*, p. 236.

267. **Poltys illepidus**, *C. Koch, Arachn.* x, p. 97, fig. 821, 1843.

Colour: carapace and mandibles blackish; upper side and front of head reddish, with greyish hairs; naked parts of femora steel-blue, bands of the same colour on under side of tibiæ and protarsi; hairy clothing on legs and abdomen greyish or yellowish brown mottled with blackish or brown spots, epigastric area of abdomen blackish. *Cephalic eminence* constricted at base; ocular quadrangle a little wider in front, as wide behind as long. *Abdomen* either tolerably evenly elliptical with scarcely a trace of tubercles, or tubercular and with large shoulder prominences.

Total length about 15 mm.

Loc. Ceylon: Punduloya (*Green*); also Indo- and Austro-Malaysia.

268. **Poltys pannuceus**, *Thorell, Spiders of Burma*, p. 167, 1895.

Colour: carapace uniformly brownish; epigastric area brown; femora without metallic-blue tints; *cephalic eminence* less constricted at base; ocular quadrangle slightly narrowed in front, wider behind than long. *Abdomen* with long conical tubercles, furnished in front with a high median apically clavate column bearing six distinct tubercles.

Total length 12·5 mm.

Loc. Burma: Rangoon (*Oates*).

Family THERIDIIDÆ.

Recognizable from the Argyopidæ by the presence of a series of strong spines forming a comb on the tarsus of the 4th leg, and by the almost entire absence of teeth on the fang-groove of the mandibles, which have no smooth area at the base on the outer side; the clypeus, moreover, is usually high.

Sedentary Spiders, spinning webs formed of irregularly arranged threads.

The species of this family are numerous and mostly of small size. The largest species belong to the genus *Lathrodectus*.

Genus **LATHRODECTUS**, Walck.

Lathrodectus, *Walck. Tabl. Aran.* p. 81, 1805; *Simon, Hist. Nat. Araign.* i, p. 568, 1894.

Carapace normal in form, with clypeus equal in height to the ocular area; lateral *eyes* widely separated. *Mandibles* weak, unarmed. *Legs* long; superior claws toothed almost to apex. *Abdomen* large, globular.

Type, *L.* 13-*guttatus*, Walck.

Distribution. Tropical and subtropical countries.

Synopsis of Indian Species.

a. Prevailing colour black, with crimson dorsal stripe	*L. hasseltii*, p. 237.
b. Prevailing colour yellowish or silvery, no crimson stripe	*L. geometricus*, p. 238.

Fig. 80. — *Lathrodectus hasseltii*, subsp. *indicus*, × 2.

269. **Lathrodectus hasseltii**, *Thorell, Œfv. K. Sv. Vet.-Akad. Förh.* xxvii, p. 369, 1870.

Subspecies **indicus**, *Simon, Bull. Mus. Hist. Nat.* 1897, p. 97.

Colour black; upper side of abdomen ornamented with a broad longitudinal red band with uneven edges extending throughout the posterior two-thirds of its length; lower side with a small transverse red band in front of the spinners and sometimes one behind the genital fold. Eyes of anterior line subequal, median nearer to each other than to the laterals. Length 10 mm.

Loc. Western India: Karachi, Poona (*Wroughton*); also Muscat.

Subspecies **elegans**, *Thorell, Ann. Mus. Genova*, xxxix, p. 293, 1898.

Differs from the preceding in having the dorsal surface of the abdomen ornamented in front of the longitudinal band with a pair of transverse recurved stripes, the posterior of which is sometimes small and continuous with the median band. Length 10 mm.

Loc. Burma: Karennee (*Fea*).

270. **Lathrodectus geometricus**, *C. Koch, Die Arachn.* viii, p. 117, fig. 684, 1841.

Colour: cephalothorax and legs ochraceous, latter with patella and tip of tibia brown; abdomen paler, varied with symmetrically disposed darker spots and brown lines arranged in loops and circles. *Eyes* of anterior line subequally spaced, the median a little larger than the laterals. Length 10 mm.

Loc. Karachi (*Townsend*). Tropics of both hemispheres.

Family PHOLCIDÆ.

Carapace flat, subcircular, with deep fovea and cephalic grooves; head small, sharply defined; anterior median eyes small, the rest large and forming a group on each side; clypeus very high. *Mouth-parts* suctorial. *Legs* exceedingly long and slender, furnished with 3 claws. *Spinners* short, subequal, forming a compact cluster; colulus present.

Distribution. Cosmopolitan.

Habits. Sedentary Spiders, spinning in hollow trees, beneath overhanging rocks or in the corners of houses, a tangled network of threads, amongst which the occupant hangs head downwards. The female carries her cocoon in her mandibles.

The best known Indian species of the family are referable to the following three genera:—

a. Sternum posteriorly acuminate; mandible armed with 2 teeth on the fang-groove . . ARTEMA, p. 238.
b. Sternum broadly truncate posteriorly, mandible with 1 tooth on fang-groove.
  a^1. Abdomen short, oval, prominent posteriorly above the spinners . . . . CROSSOPRIZA, p. 240.
  b^1. Abdomen long, cylindrical, not strongly prominent above spinners . . . . SMERINGOPUS, p. 239.

Genus ARTEMA, Walck.

Artema, *Walck. Ins. Apt.* i, p. 656, 1837; *Simon, Hist. Nat. Araign.* i, p. 465, 1893.

Eyes subsimilar, anterior medians not much smaller than the rest, those of anterior line very lightly, of posterior line more strongly recurved; area of medians not longer than wide. *Mandibles* armed below on fang-groove with two teeth. *Sternum* posteriorly acuminate, projecting between the posterior coxæ. *Abdomen* very high, globular, higher than wide.

Type, *A. atlanta*, Walck.

Distribution. Tropical and subtropical countries of the world.

271. **Artema atlanta**, *Walck. Ins. Apt.* i, p. 656, 1837: convexa, *Blackw. A. M. N. H.* (3) ii, p. 332, 1858: sisyphoides, *Doleschall, Nat. Tijdschr. Nederl. Indië*, xiii, p. 408, 1857 (Pholcus).

♀. *Colour*: carapace yellow, with median brown patch and brown stripe on clypeus; legs yellow, with brown patellæ and a brown ring round extremity of femora and tibiæ; abdomen greyish yellow, ornamented with three rows of dusky grey spots. Mandible and palpus normal. *Vulva* consisting of a brown, thickly horny plate, with the posterior border concave.

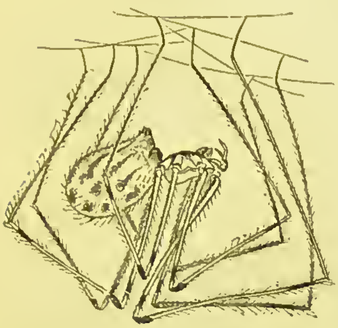
Fig. 81.—*Artema atlanta*, ♂, × 2.

♂. Like ♀, but with palp very thick and mandibles furnished externally, with large serrated crest.

Total length about 8 mm.

Loc. Ceylon: Jaffna, Trincomali (*Yerbury*). India: Travancore (*Ferguson*); Guntakal; Chingleput (*Jambunathan*); Dekkan; Tanna (*Edie*); Meerut; eastern district of Poona (*Irani*); E. Khandesh; Karachi (*Townsend*). Burma: Tharrawaddy (*Oates*). Tropical countries.

Genus **SMERINGOPUS**, Simon.

Smeringopus, *Simon, Ann. Soc. Ent. Fr.* 1890, p. 94; *id. Hist. Nat. Araign.* i, p. 476, 1893.

Eyes of anterior and posterior line recurved, ocular quadrangle longer than wide, space between posterior medians about twice the diameter of an eye. *Abdomen* long, narrow, subcylindrical. *Sternum* broadly truncate behind.

Type, *S. elongatus*, Vinson.

Distribution. Tropical countries of the world.

272. **Smeringopus elongatus**, *Vinson, Aran. Réunion, etc.* p. 135, t. iii, fig. 5, 1863: distinctus, *O. P. Cambridge, Journ. Linn. Soc., Zool.* x, p. 380, t. xi, figs. 28, 29, 30, 1869 (Pholcus).

♀. *Colour*: carapace yellow, with radiating triangular dark patches; legs yellow-brown, with pale white band round end of femora and tibiæ; abdomen greyish white, ornamented above with a double series of black spots and at the sides with large black patches, ventral surface with a broad reddish-brown median band, divided posteriorly by a pale stripe.

♂. Like ♀, but with palpus much inflated, and the mandible armed in front below with a small tooth.

Total length 6 mm.

Loc. Ceylon. India: Trevandrum (*Ferguson*), Pondichery, Dekkan. Burma: Rangoon, Tharrawaddy, Tenasserim (*Oates, Fea*). Andaman Islands. Indo- and Austro-Malaysia, and tropical Africa, &c.

Genus **CROSSOPRIZA**, Simon.

Crossopriza, *Simon, Hist. Nat. Araign.* i, p. 476, 1893.

Differing from *Smeringopus* in having the ocular quadrangle as long as wide, and the posterior median eyes separated by a space not exceeding the diameter of an eye. The abdomen is short, ovate, posteriorly prominent and sloping abruptly away to the spinners.

Type, *C. pristina*, Simon (Egypt).

Distribution. Egypt, Arabia, and India.

273. **Crossopriza lyoni**, *Blackwall, A. M. N. H.* (3), xix. p. 392, 1867 (Pholcus).

♀. *Colour* yellowish; carapace marked with median brown stripe; legs spotted and streaked with black, extremities of femora and tibiæ paler; abdomen yellowish brown, clouded with darker patches and marked with minute close-set yellowish spots, some black spots upon its posterior portion and a black stripe running down to the spinners from the posterior prominence, ventral surface black, varied with pale markings.

♂. Much like ♀, but with legs longer, abdomen lower, mandible armed distally with a tooth; femur of anterior leg with a row of long spines; palpi very thick.

Total length 5–6 mm.

Loc. India: Madras (*Henderson*); Chingleput (*Jambunathan*); E. Khandesh (*Madan*), Allahabad (*Ryves*). Meerut. Burma: Tharrawaddy (*Oates*).

Family HERSILIIDÆ.

Carapace as wide as long, with cephalic region elevated, narrow and defined by a deep semicircular sulcus; eyes of anterior and posterior lines strongly recurved, the anterior laterals standing high up halfway between the anterior and posterior medians. *Mandibles* weak, at most weakly toothed below; maxillæ inclined obliquely on the labium. *Legs*, except of 3rd pair, very long and slender, armed with 3 claws. *Abdomen* short, subpentagonal; posterior spinning-mamillæ very long, usually longer than the abdomen; colulus present.

Distribution. Africa, Madagascar, S. Asia, Australia, S. America.

The species of this family are extremely active hunting Spiders, living on tree-trunks, old walls, or under stones, and at most spinning a scanty web of irregular threads.

Synopsis of Indian Genera.

a. Protarsi of legs undivided .... TAMA, p. 242.
b. Protarsi of 1st, 2nd, and 4th legs bisegmented.
  *a*¹. Ocular quadrangle nearly parallel-sided..... HERSILIA, p. 241.
  *b*¹. Ocular quadrangle much wider in front than behind .... MURRICIA, p. 242.

Genus **HERSILIA**, Aud.

Hersilia, *Audouin in Sav. Descr. Egypte, Arachn.* p. 114, 1826; *Simon, Hist. Nat. Araign.* i. p. 446, 1892.

Ocular quadrangle parallel-sided; head flat, angular laterally; clypeus usually very high, prominent. Protarsi of 1st, 2nd, and 4th legs bisegmented.

Type, *H. caudata*, Aud.

Distribution. Africa, Madagascar, Oriental Region.

Synopsis of Indian Species.

a. Clypeus less than height of ocular quadrangle. ..... *H. clathrata*, p. 242.
b. Clypeus exceeding height of ocular quadrangle.
  *a*¹. Vulva without median lobe; patella of palp in ♂ with conical process .... *H. savignyi*, p. 241.
  *b*¹. Vulva with median lobe; patella of palp normal .... *H. pectinata*, p. 241.

274. **Hersilia savignyi**, *Lucas, Mag. Zool.* 6e année, cl. viii, p. 10 t. xiii, fig. 1, 1836: ? calcuttensis, *Stoliczka, J. A. S. B.* xxxviii p. 216, t. xx, fig. 9, 1869.

♀. *Colour* varying from quite pale to nearly black on the upper side, generally mottled or banded; abdomen with a black rim, transverse stripe, and a median longitudinal black bar in front; legs and palpi banded. *Clypeus* considerably exceeding ocular quadrangle; width of carapace less than half the length of the femur of the 1st leg. *Vulva* bilobate, the lobes separated by deep emargination.

Fig. 82.—*Hersilia savignyi*, × 4/3 (after Simon). The spinners are represented as much too short.

♂. Smaller than ♀; femur of 1st leg nearly four times as long as carapace; patella and tibia of palp with a distinct sigmoid curvature, patella produced above on the inner side into a conical hairy prominence.

Measurements in mm.—♀. Total length about 10, carapace 3·5, 1st leg 35. ♂. Total length 7, carapace 3, 1st leg 40.

Loc. Ceylon. India: Nilgiri Hills (*Hampson*); Madatory and Ponmudi in Travancore (*Ferguson*), Chingleput (*Jambunathan*): Yercaud (*Henderson*); Bellary; Tanna (*Edie*); Matheran; Poona (*Wroughton*); Allahabad (*Ryves*); Calcutta. Burma: Mandalay, Bhamo, Pegu, Tenasserim (*Oates*, *Fea*).

275. **Hersilia pectinata**, *Thorell, Spiders of Burma*, p. 58, 1895, ♂: peguana, *id. ibid.* p. 60, ♀.

Closely allied to *H. savignyi*, but recognizable by the form of the generative organs. *Vulva* trilobate posteriorly, the median lobe projecting beyond the laterals. *Palpi* of ♂ with patella and tibia

straight, the former unmodified, the tibia furnished externally above with an angular prominence tipped with 3 or 4 spines.

Total length, ♀ 12·5 mm., ♂ 11 mm.

Loc. Ceylon: Punduloya (*Green*). Burma: Pegu and Tharrawaddy (*Oates*).

276. **Hersilia clathrata***, *Thorell, Spiders of Burma*, p. 56, 1895.

♀. *Colour* much as in the preceding, but the black rim of the abdomen broader, and with four pairs of black spots on each side of the middle. Further recognizable by having the *clypeus* low, less than the height of the ocular quadrangle. Femur of anterior *leg* just three times as long as the carapace. *Vulva* semicircularly excavated behind, the excavation filled by a pair of lobes separated by a deep but narrow notch.

Total length 10 mm., carapace 3·6.

Loc. Burma: Tenasserim (*Oates*).

Genus MURRICIA, Simon.

Murricia, *Simon, Ann. Mus. Genova*, xviii, p. 255, 1882; *id. Hist. Nat. Araign.* i, p. 446, 1892.

Differs from *Hersilia* in having the ocular quadrangle much wider in front than behind, and the head elevated between the posterior median and lateral eyes.

Type, *M. indica*, Lucas.

Distribution. S. India.

277. **Murricia indica**, *Lucas, Mag. Zool.* 6e année, cl. viii, p. 7, t. 13, fig. 2, 1836 (Hersilia); *Simon, Ann. Mus. Genova*, xviii, p. 255, 1892.

♀. *Colour*: carapace pale in the middle and behind, blackish elsewhere; mandibles pale, darker at base; palpi and legs banded: abdomen with a median and on each side a darker band.

♂. Slighter and more elongate than female, and with stronger legs; patella of palp longer than tibia.

Total length 8 mm.

Loc. Western India: Bombay and Malabar (*Lucas*).

Genus TAMA, Simon.

Tama, *Simon, Ann. Mus. Genova*, xviii, p. 256, 1882; *id. Hist. Nat. Araign.* i, p. 446, 1892.

Differs from *Hersilia* in having the protarsi of the 1st, 2nd, and 4th legs undivided.

Type, *T. edwardsi*, Lucas.

Distribution. North Africa, Oriental Region, Australia, S. America.

278. **Tama variata**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 751, 1899.

♀. *Colour* variable, as in *Hersilia savignyi*. *Carapace* with

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* The only known specimen of this species has imperfect legs, and hence may belong to the genus *Tama*.

ocular quadrangle a little longer than broad and slightly wider in front than behind, much exceeding height of clypeus, which scarcely exceeds diameter of anterior median eye. First *leg* shorter than 4th, its femur about twice the length of the carapace. *Vulva* with its posterior border produced into a median convex lobe, with a transversely sulcate area on each side of it.

♂. Much smaller than ♀, femur of 1st leg more than twice as long as carapace. *Palp* with patella and tibia unmodified, tibia twice as long as patella.

Measurements in mm.—♀. Total length 10, carapace 3·5, 1st leg 31. ♂. Total length 6, carapace 3.

Loc. Ceylon: Kandy (*Green*).

Family UROCTEIDÆ.

Carapace transversely reniform, widely rounded in front and laterally, posteriorly emarginate; ocular group compact. *Mouth-parts* weak and haustellate. *Legs* short and strong, spiny, subequal in length, armed with 3 claws. *Abdomen* large, depressed, truncate in front, oval posteriorly; posterior spinners much longer than the anterior, with the long, thick, compressed apical segment directed upwards; anterior spinners short, subcylindrical, separated by a colulus; anal papilla very large, furnished laterally with fringe of long hair.

Distribution. Mediterranean Region; China, Japan; S. Africa; India.

Genus **UROCTEA**, Duf.

Uroctea, *Dufour, Ann. Sci. Phys.* v, p. 198, 1820; *Simon, Hist. Nat. Araign.* i, p. 451, 1893.

Characters and distribution as above.

Type, *U. durandi*, Latr.

Habits. These Spiders live under stones, &c., where they spin a small saccular tent-like web attached to the under side of the stone by about five subradially arranged bands of silk.

279. **Uroctea indica**, sp. n.

Fig. 83.
Uroctea indica, ♀, × $\frac{4}{3}$.

♀. *Colour*: carapace and legs darker or paler yellowish brown, with blackish markings; abdomen blackish above, sometimes marked with seven pale spots, six lateral and one posterior median. *Vulva* consisting of a transversely-elliptical plate, impressed behind with a small circular pit and marked with nearly semicircular grooves in front.

Total length 13 mm.

Loc. Western India: Poona (*Wroughton*).

Family LYCOSIDÆ.

Hunting Spiders with the *carapace* narrow in front, high; the eyes of the posterior line strongly recurved, typically large, those of the anterior line being as a rule much smaller and close-set. *Mandible* powerful, not elongate, with fang-groove strongly toothed; maxillæ not inclined inwards, labium quite short. *Legs* spiny, usually shortish and strong; tarsi with 3 claws and no ungual tufts. *Abdomen* oval, rarely elongate; spinners forming a compact group, generally subequal in length.

Distribution. Cosmopolitan.

Synopsis of the principal Indian Genera.

a. Tarsi of legs long, slender, and highly flexible.
- *a*[1]. Fang-groove armed behind with 4 teeth. EUCAMPTOPUS, p. 244.
- *b*[1]. Fang-groove armed behind with 3 teeth. HYGROPODA, p. 245.

b. Tarsi shorter and rigid.
- *a*[2]. Anterior lateral eyes stalked, on the edge of the clypeus .... EUPROSTHENOPS, p. 248.
- *b*[2]. Anterior lateral eyes above the edge of the clypeus.
  - *a*[3]. Eyes of anterior line very strongly recurved .... THALASSIUS, p. 247.
  - *b*[3]. Eyes of anterior line procurved, straight, or slightly recurved.
    - *a*[4]. Ocular quadrangle a little longer than wide; eyes of the quadrangle not very unequal.
      - *a*[5]. Eyes of anterior line procurved.. PERENETHIS, p. 245.
      - *b*[5]. Eyes of anterior line straight or slightly procurved .... DENDROLYCOSA, p. 246.
    - *b*[4]. Ocular quadrangle much wider than long; posterior medians much larger than anterior.
      - *a*[6]. Posterior spinners much longer than anterior .... HIPPASA, p. 249.
      - *b*[6]. Posterior spinners subequal to anterior.
        - *a*[7]. 3rd leg longer than 1st ...... OCYALE, p. 251.
        - *b*[7]. 3rd leg shorter than 1st ...... LYCOSA, p. 252.

Genus **EUCAMPTOPUS**, nov.

Carapace (in ♂) about as wide as long, high behind, flat above; frontal area inclined; clypeus exceeding the ocular quadrangle, which is a little wider behind than it is long, and twice as wide behind as in front; *eyes* of anterior line straight, a little wider than the posterior medians, which are twice the diameter of the

anterior medians. Fang-groove of *mandible* armed behind with 4 strong teeth. *Legs* long, spiny; tarsi long, slender, and flexible.

Type, *E. coronatus*, Poc.

Distribution. S. India.

280. **Eucamptopus coronatus**, sp. n.

♂. *Colour* a tolerably uniform dark chocolate-brown, paler beneath, clothed with olive-brown hairs; clypeus and anterior half of sides of carapace covered with snow-white hairs. *Carapace* almost as wide as long; eyes of anterior line straight, subequally spaced, medians a little the larger. *Legs* long and slender, with long flexible tarsi. *Palpi* longer than the carapace by the length of the tarsus; tibia slightly exceeding patella, incrassate, the apophysis short, stout, subquadrate.

Total length 17 mm., carapace 8·5, 1st leg 43, 4th 46.

Loc. S. India: Tinnevelly (*Barber*).

Genus **HYGROPODA**, Thorell.

Hygropoda, *Thorell, Bull. Soc. Ent. Ital.* xxvi, pt. iii, p. 4, 1894; *Simon, Hist. Nat. Araign.* ii, p. 315, 1898.

Resembling the preceding in having the tarsi of all the legs, with exception of the 3rd pair, long and flexible, but differing in that the clypeus is less in height than the ocular quadrangle; the eyes are more scattered, and there are only 3 teeth on the posterior border of the fang-groove of the mandible.

Type, *H. prognatha*, Thorell.

Distribution. Tropical Africa; Bourbon; Oriental Region; S. America.

281. **Hygropoda procera**, *Thorell, Spiders of Burma*, p. 222, 1895.

♀. *Colour*: carapace with two parallel dark bands above; abdomen yellowish above, with median dark anteriorly-bifurcating line and a lateral posteriorly sinuous line; pale below; legs and sternum pale, with whitish hairs. *Carapace* a little longer than broad; eyes of anterior line slightly procurved, the medians the largest. *Legs* very long and slender. *Abdomen* sublanceolate; *vulva* large, deeply excavated, and surmounted in front by a pair of elevated tubercles and ending behind in a pair of smaller tubercles.

Total length 12 mm., carapace 5·75, 1st leg 46·5.

Loc. Burma: Tharrawaddy (*Oates*).

Genus **PERENETHIS**, L. Koch.

Perenethis, *L. Koch, Arach. Austral.* p. 980, 1878.
Tetragonophthalma, *Simon, Hist. Nat. Araign.* ii, p 293, 1898 (*not of Karsch*).

Differs from *Dendrolycosa*, especially in having the eyes of the

anterior line very distinctly procurved, and the fang-groove armed behind with only 2 small teeth.

Type, *P. unifasciata*, Dol.

Distribution. Oriental and Australian Regions.

282. **Perenethis unifasciata**, *Doleschall, Verh. Nat. Vereen. Nederland. Indië*, v, no. 5, p. 10, t. vi, fig. 6, 1859 (Dolomedes); *Thorell, Spiders of Burma*, p. 230, 1895.

According to Simon, this species, which is unknown to me in its adult stage, differs from the following in having the eyes of the anterior line more strongly procurved, the quadrangle considerably longer than wide, and the clypeus narrower.

Loc. Ceylon (according to Karsch). Burma: Akyab (*Oates*).

283. **Perenethis indica**, *Simon, Bull. Mus. Paris*, 1897, p. 295 (Tetragonophthalma).

♀. *Colour*: carapace and abdomen with a broad median dark band, sparsely clothed with white at the sides, the dark band set off by a narrow stripe of silver; sternum with pale median band; coxæ and sternum spotted with black; anterior femora infuscate below; abdomen darker posteriorly. *Legs* long and slender, 1st and 2nd about equal, and a little shorter than the 4th. *Abdomen* long and narrow, posteriorly acuminate. *Vulva* consisting of a transversely oval pit, divided by a median longitudinal partition.

Total length 14 mm., carapace 5, 1st leg 20, 4th 26.

Loc. Eastern district of Poona (*Irani*); Karachi.

The following genus and species, based upon an immature specimen, differs from the foregoing species of *Perenethis* in having the anterior lateral eyes considerably larger than the medians:—

Polybœa vulpina, *Thorell, Spiders of Burma*, p. 229, 1895.

Loc. Rangoon (*Oates*).

Genus **DENDROLYCOSA**, Doleschall.

Dendrolycosa, *Doleschall, Verh. Nat. Vereen. Nederland. Indië*, v, no. 5, p. 51, 1859; *Simon, Hist. Nat. Araign.* ii, p. 294, 1898.

Carapace much longer than wide; ocular area inclined at an angle to clypeus, quadrangle longer than wide, exceeding clypeus; anterior and posterior median *eyes* not very unequal in size; eyes of anterior line straight or lightly recurved, much wider than those of 2nd line. Fang-groove of *mandible* with 3 teeth behind. *Legs* straight; tarsi shorter and rigid.

Type, *D. fusca*, Dol.

Distribution. Oriental Region and Australia.

284. **Dendrolycosa stauntoni**, sp. n.

♀. *Colour*: integument yellowish brown, carapace with a broad white band extending almost to the margin on each side; abdomen covered above and below with whitish hairs, its upper side with a median dark band, bordered with white in front; legs covered with whitish hairs intermixed with black; extremities of the segments darker; lower side of femora infuscate. *Carapace* much longer than broad, as long as tibia of 2nd leg; *eyes* of anterior line very slightly recurved, subequal, about a diameter apart, and half a diameter from the laterals. *Abdomen* oval; *vulva* with a median excavation bordered in front by a ∽-shaped crest.

Measurements in mm.—Total length 20, carapace 7·5, 1st leg 28, 4th leg 31.

Loc. S. India: Bangalore (*Staunton*).

285. **Dendrolycosa robusta**, *Thorell, Spiders of Burma*, p. 224, 1895 (Therimachus).

♀. Closely resembling the preceding in form and colour. *Vulva* with anterior transverse crest more Λ-shaped.

♂. Smaller. Tibia of *palp* twice as long as patella, longer than tarsus, the apophysis consisting of a single anteriorly-directed pointed spur.

Measurements in mm.—♀. Total length 22, carapace 8·5, 1st leg 30, 4th 31·5. ♂. Total length 26.

Loc. Burma: Kyeikpadam and Tharrawaddy (*Oates*).

The following species, based upon immature forms, are probably congeneric with the foregoing, but are specifically indeterminable:—

Sphedanus spadicarius, *Simon, Mém. Soc. Zool. Fr.* x, p. 262, 1897.

Loc. North Guzerat.

Sphedanus marginatus, *Simon, J. A. S. B.* lvi, p. 284, 1887.

Loc. Port Blair (Andamans).

Genus **THALASSIUS**, Simon.

Thalassius, *Simon, Bull. Soc. Zool. Fr.* x, p. 13, 1885; *Hist. Nat. Araign.* ii, p. 300, 1898.

Facial area evenly inclined as in *Eucamptopus*, and clypeus exceeding ocular quadrangle, but quadrangle scarcely narrower in front and slightly longer than wide; anterior and posterior median eyes subequal as in *Dendrolycosa*; eyes of anterior line very strongly recurved, the anterior laterals nearly equally distant from the remaining three on each side.

Type, *T. marginellus*, Sim.

Distribution. Ethiopian Region; Madagascar; Oriental Region as far as Solomon Islands.

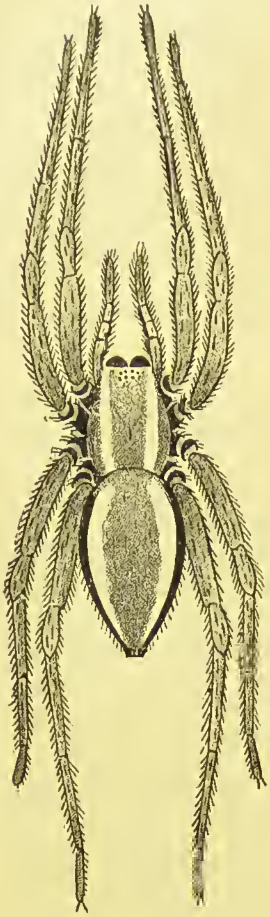

Fig. 84.
Thalassius phipsoni, ♀, × 4/3.

286. **Thalassius phipsoni**, *F. Cambridge, P. Z. S.* 1898, p. 31, t. iv, fig. 5.

♀. *Colour*: integument covered with olive or greyish-brown pubescence; carapace and abdomen ornamented laterally with a white stripe extending from the sides of the head almost to the spinners, and separated from the middle of the lateral border of the carapace by a space equalling its own width. *Carapace* a little longer than tibia of 1st leg. *Legs* of 1st, 2nd, and 3rd pairs subequal and much shorter than 4th. Lateral lobes of *vulva* strongly clavate and in contact posteriorly.

Measurements in mm.—Total length 26, carapace 10, 1st leg 37, 4th 43.

Loc. Bombay: Máhim and Dorun (*Phipson*).

The characters of the following forms, known in Burma only from immature specimens, are doubtful:—

Thalassius marginellus, *Simon, Ann. Mus. Genova*, xx, p. 329, 1884 (Titurius); *id. Bull. Soc. Zool. Fr.* x, p. 13, 1885.

Thalassius albocinctus (*Dol.*), *Thorell, Spiders of Burma*, p. 227, 1895.

Genus **EUPROSTHENOPS**, Pocock.

Euprosthenops, *Pocock, A. M. N. H.* (6) xix, p. 116, 1897; *Simon, Hist. Nat. Araign.* ii, p. 291, 1898. [*Podophthalma*, Capello and recent authors, preoccupied.]

Carapace low; facial area inclined; ocular quadrangle about equal to clypeus in height, longer than wide, narrowed in front, its posterior eyes larger than the anterior; anterior lateral eyes remote from the rest and elevated, situated on the edge of the clypeus. Tarsi normal. Fang-groove of *mandible* with 3 posterior teeth.

Type, *E. bayoniannus*, Br. Capello.

Distribution. Tropical Africa; Madagascar; India.

287. **Euprosthenops ellioti**, *O. P. Cambridge, P. Z. S.* 1877, p. 567, t. lvii, fig. 6 (Podophthalma).

♀. *Colour*: carapace pale with a dark band on each side, clothed with silvery-white hairs; legs clothed with olive-brown hairs varied with white, femora thickly spotted; tibiæ black at base and apex; abdomen darkish above, with median lanceolate band in front, bordered at the sides with a broad pale band, sides and lower surface covered with golden-yellow hairs, the former speckled with brown. *Carapace* shorter than tibia of 3rd leg. *Legs* very long, 4, 1, 2, 3 in length. *Abdomen* narrowed posteriorly, more than twice as long as broad.

Measurements in mm.—Total length 21, carapace 7·5, 1st leg 41, 4th 46.

Loc. S. India: Chingleput (*Jambunathan*).

Genus **HIPPASA**, Simon.

Hippasa, *Simon, Bull. Soc. Zool. France,* x, p. 31, 1885; *Hist. Nat. Araign.* ii, p. 326, 1898.

Differing from *Lycosa* in having the posterior *spinners* considerably longer than the anterior, the posterior *eyes* more widely separated, and the eyes of the anterior line a little exceeding those of the second line in width.

Type, *H. agelenoides*, Simon.

Distribution. Africa; Madagascar; Arabia; British India; Malayasia.

These Spiders spin a silken thread which expands into a sheet-like snare.

Synopsis of the principal Indian Species.

a. Lower surface of abdomen with a thick fringe of hair on each side .... *H. pantherina*, p. 250.
b. Lower surface of abdomen not laterally fringed.
  a^1. Of large size; carapace 8–9 mm. long; pit of vulva exposed.
    a^2. Pit of vulva semicircular .... *H. lycosina*, p. 250.
    b^2. Pit of vulva transversely elliptical .... *H. olivacea*, p. 250.
  b^1. Smaller; carapace up to 5 mm.; pit of vulva roofed over.
    a^3. Plate of vulva produced into a long tongue-like process .... *H. holmeræ*, p. 251.
    b^3. Plate of vulva not produced into a long tongue-like process.
      a^4. Process of vulva triangularly pointed behind .... *H. pisaurina*, p. 250.
      b^4. Process of vulva squarely truncate behind........................ *H. agelenoides*, p. 251.

288. **Hippasa pantherina,** *Pocock, Jour. Bom. N. H. Soc.* xii, p. 752, 1899 (= greenalliæ, *Simon, Bull. Soc. Zool. Fr.* x, p. 31, 1885) (? *of Blackwall*).

♀. *Colour*: integument ochraceous, clothed with silky greyish hairs; carapace with median narrow pale stripe and broader pale border; abdomen with a pair of longitudinal dark bands in front above and transverse dark bands behind, the darker markings emphasized by pale lines; legs obscurely banded above, sternum with median black stripe. *Legs* and upper side of abdomen beset with longish setæ; under side of abdomen with two thick bands of long setæ. *Carapace* as long as patella and tibia of 4th leg, slightly longer than those of 1st, and than protarsus of 4th. *Vulva* consisting of a large, yellow, thickly-hairy plate, produced posteriorly into a pair of blackish angular processes separated by a median angular notch.

♂. Like the ♀, but with much longer legs.

Measurements in mm.—♀. Total length 16, carapace 7·5, 1st leg 21·5, 4th 27. ♂. Total length 15, carapace 7, 1st leg 26, 4th 33.

Loc. Ceylon: Trincomali (*Yerbury*). India: Trivandrum (*Ferguson*); Ootacamund (*Hampson*); Coimbatore; Ramnad; Bangalore (*Staunton*); Poona district (*Wroughton*); E. Khandesh (*Madan*).

289. **Hippasa lycosina,** sp. n.

♀. As large as the preceding, but rather differently coloured, the pale bands on the carapace more clearly defined, the legs not banded, and the pattern of the abdomen less distinct. *Carapace* lower; legs and abdomen not thickly hirsute and without crest of setæ on under side of abdomen. *Vulva* consisting of a small brown plate impressed posteriorly with a nearly semicircular, posteriorly-open pit.

Measurements in mm.—Total length 20, carapace 9·5, 1st leg 26, 4th 34.

Loc. India: Eastern district of Poona (*Irani*); Kanara; Nasik (*Millet*); Uran (*Aitken*).

290. **Hippasa olivacea,** *Thorell, Ann. Mus. Genova,* xxv, p. 297, 1887: simonis, *id. ibid.* p. 301 (Diapontia).

Nearly allied to *H. lycosina*, but with longer legs, the carapace shorter than the patella and tibia of the 1st and than the protarsus of the 4th leg. *Vulva* much as in *H. lycosina*, but with the pit transversely elliptical.

Measurements in mm.—Total length 17, carapace 8, 1st leg 24, 4th 30·5.

Loc. Burma: Rangoon, Tharrawaddy, Tenasserim, &c. (*Oates, Fea*).

291. **Hippasa pisaurina,** sp. n.

♀. Much smaller than the preceding species, but very similarly

coloured, with the legs banded and mottled as in *H. pantherina*; abdomen banded with white below. *Carapace* as long as patella and tibia of 1st leg, but distinctly shorter than patella and tibia and than protarsus of 4th; eyes of anterior line very unequal in size, medians nearly twice the diameter of the laterals, their inferior edges in a straight line. *Vulva* consisting of a plate triangularly pointed behind and forming an archway over the cavity.

Measurements in mm.—Total length 11, carapace 4·5, 1st leg 14, 4th 20.

Loc. Western India: E. Khandesh (*Madan*) and E. Poona (*Wroughton*); Bangalore (*Staunton*).

292. **Hippasa agelenoides,** *Simon, Ann. Mus. Genova,* xx, p. 334, 1884 (Pirata); *Thorell, Spiders of Burma,* p. 218, 1895 (Hippasa).

In size, length of limbs, &c. nearly resembling the preceding; darker in colour; abdomen with a narrow black band on each side below. *Eyes* of anterior line more nearly equal, medians at most a little larger than the laterals, with their inferior edges standing much higher. *Vulva* forming a vertical archway as in *H. pisaurina*, but the posterior border of the arch transversely truncate.

Length up to about 10 mm., carapace 5, 1st leg 15, 4th 20.

Loc. Burma: Rangoon, Tharrawaddy (*Oates*), Minhla (*Comotto*). Also recorded by Simon, but perhaps erroneously, from the Konkan and Dehra Dún.

293. **Hippasa holmeræ,** *Thorell, Spiders of Burma,* p. 218, 1895.

A small paler-coloured species, with the legs not banded; recognizable from all the foregoing by having the plate of the *vulva* produced posteriorly into a long, backwardly-directed tongue-like process. Total length 8 mm.

Loc. Burma: Tharrawaddy (*Oates*). Also Singapore.

The following species are unknown to me:—

Hippasa greenalliæ, Blackwall, A. M. N. H. (3) xix, p. 387, 1867 (*Lycosa*), from Meerut, Agra, or Delhi. Recorded by Simon from Matheran and Karachi, and by Karsch from Peradeniya &c., in Ceylon.

Hippasa partita, O. P. Cambridge, P. Z. S. 1876, p. 599 (*Trochosa*), from Alexandria. Recorded by Simon from Karachi.

Genus **OCYALE**, Aud.

Ocyale, *Audouin, in Sav. Descr. Egypte, Arach.* p. 149, 1826; *Simon, Hist. Nat. Araign.* ii, p. 345, 1898.

Allied to *Lycosa*, but with the 3rd leg slightly longer than the 1st; quadrangle of posterior eyes much wider behind, as in *Hippasa*;

eyes of anterior line slightly recurved, medians much larger than laterals, the four taken together about as wide as the two anterior medians.

Type, *O. atalanta*, Aud.

Distribution. Africa; Ceylon and Burma.

294. **Ocyale atalanta**, *Audouin, in Sav. Descr. Egypte, Arach.* p. 150, 1826.

Prevailing colour yellow, sides of carapace densely mottled with olive-black; legs strongly banded; upper side of abdomen marbled with olive-black, and marked with white spots; mandibles blackish, clothed with greyish-brown hairs in front. *Legs* covered with long, white, apically-hooked hairs.

Length about 20 mm.

Loc. Ceylon (*Sarasin*); Punduloya (*Green*).

Genus **LYCOSA**, Latreille.

Lycosa, *Latreille, Nouv. Dict. d'Hist. Nat.* xxiv, p. 135, 1804; *Simon, Hist. Nat. Araign.* ii, p. 345, 1898.

Carapace long as in *Dendrolycosa*; facial area vertical, four posterior eyes very large and arranged in a quadrangle, which is a little wider behind than in front; eyes of anterior line small, straight or slightly curved, not or scarcely exceeding those of the second line in width; clypeus very low, scarcely exceeding diameter of anterior median eyes.

Type, *L. tarantula*, Rossi.

Distribution. Temperate, Tropical, and Arctic countries.

The species of this genus spin no web. The larger forms live in silk-lined burrows, and under stones, &c. The females carry the cocoon attached to the spinners, and the young, after hatching, swarm on the mother's back.

Synopsis of the larger Indian Species.

- *a.* Sternum olive-yellow; legs pale, not banded . *L. chaperi*, p. 254.
- *b.* Sternum black; tibiæ at least of posterior legs banded below.
  - a^1. Black ventral area of abdomen serially spotted with white .... *L. catula*, p. 254.
  - b^1. Black ventral area of abdomen unspotted.
    - a^2. Tibiæ of all the legs strongly banded . . *L. indagatrix*, p. 254.
    - b^2. Tibiæ of anterior legs not banded.
      - a^3. Femora of anterior legs infuscate beneath .... *L. wroughtoni*, p. 253.
      - b^3. Femora of anterior legs pale beneath.
        - a^4. Femora with black apical spot below .... *L. nigrotibialis*, p. 253.
        - b^4. Femora without black apical spot. . *L. phipsoni*, p. 253.

295. **Lycosa phipsoni,** *Pocock, Jour. Bom. N. H. Soc.* xii, p. 751, 1899.

Fig. 85.—*Lycosa phipsoni*, ♀, ×$\frac{4}{3}$.

♀. Carapace with broad yellowish band down middle, darker laterally with marginal band; mandibles black, clothed above with yellow-red hairs; legs greyish white below, with tarsi, protarsi of all, and tibiæ of anterior two pairs infuscate; tibia of 4th fuscous at the end, white in middle; coxæ and sternum reddish to blackish brown; abdomen jet-black below, whitish laterally, yellowish above speckled with black, and with an anterior median black band. *Carapace* longer than patella and tibia of 1st or 4th legs; *eyes* of anterior line very slightly procurved, medians larger than laterals. *Vulva* consisting of a nearly semicircularly rounded excavation and a ⊥-shaped bar, the upright of the ⊥ mesially expanded.

Length 20 mm.

♂. Like female in colour &c., but with legs longer.

Loc. India: Bombay (*Phipson*); Jaoli in Satara (*Master*); Uran (*Aitken*); Kanara and Násik (*Millet*).

296. **Lycosa wroughtoni,** *Pocock, Jour. Bom. N. H. Soc.* xii, p. 751, 1899.

Much resembling the male of *L. phipsoni* in colour, but the carapace not so vividly banded, the abdomen without any anterior median black stripe, the hairs on the mandible and palpi bright orange-red, and the femora of the anterior legs infuscate below. Tarsus of palp also more globular at base.

Length 25 mm.

Loc. India: Bulsar in Guzerat (*Wroughton*).

297. **Lycosa nigrotibialis,** *Simon, Ann. Mus. Genova,* xx, p. 330, 1884.

♀. Closely resembling *L. phipsoni* in size, colour, &c., but with a dark band at the extremity of the femora beneath.

Total length about 25 mm.

Loc. Burma: Rangoon, Tharrawaddy, Minhla, Tenasserim, &c. (*Oates*, *Fea*).

298. **Lycosa indagatrix,** *Walck. Ins. Apt.* i, p. 339, 1837; *Simon, Ann. Mus. Genova,* xx, p. 366, 1884.

♀. Closely resembling *L. phipsoni* in colour &c.; the mandible clothed almost to the apex with red hairs, and the tibiæ of all the legs banded below, being white in the middle and blackish at the ends. *Vulva* with fovea scarcely longer than wide; the median keel rather narrow and distinctly swollen in the middle.

♂. Carapace more strongly banded than in female; legs longer, with white tibial bands broader than the dark patches on the anterior legs.

Total length (♀) about 25 mm., carapace 12·5.

Loc. S. India: Pondichery, Wagra-Karoor in Bellary, &c. (*Simon*); Chingleput (*Jambunathan*).

299. **Lycosa catula,** *Simon, Bull. Soc. Zool. Fr.* x, p. 457, 1885.

♀. At once recognizable from the preceding species by having the black of the lower side of the abdomen relieved by numerous white spots irregularly arranged laterally and forming more definite longitudinal lines mesially. Tibiæ of all the *legs* white in the middle below as in *L. indagatrix*, but the white not broader than the black at the extremities. Median bar of *vulva* very acute.

Length up to about 20 mm.

Loc. S. India: Coimbatore (*Theobald*); Yercaud in the Shevaroy Hills (*Henderson*).

300. **Lycosa chaperi,** *Simon, Bull. Soc. Zool. Fr.* x, p. 8, 1885; *id. op. cit.* p. 458, t. x, fig. 3, 1885.

♀. Differs from all the foregoing species in having the sternum and coxæ reddish or olive-yellow instead of black, and the legs entirely pale below, not even the tibiæ of the 4th being banded. Fovea of *vulva* closed behind by a large, transversely trapeziform plate, without any median keel.

Length 14 mm.

Loc. Wagra-Karoor near Guntakal, Bellary district (*Fabre*).

Family OXYOPIDÆ.

Carapace oval, high; head narrow, subacuminate; *eyes* forming a compact subcircular group, those of the posterior line being typically strongly procurved and those of the anterior recurved, the anterior medians minute; clypeus very high, vertical. *Mandibles* long, not prominent, acuminate; fang short; fang-groove unarmed or weakly armed; maxillæ and labium very long. *Legs* long, slender, armed with long black spines, not scopulate; three claws. *Abdomen* generally oval, narrowed behind; spinning-mamillæ short, subequal; a small colulus present.

Distribution. Temperate and tropical countries.

Hunting Spiders, spinning no web, living amongst grass and other plants and fastening their cocoons to the leaves or stalks.

The following genera are represented in India :—

a. Eyes of the posterior line lightly procurved ; fang-groove of mandible unarmed	PEUCETIA, p. 255.
b. Eyes of posterior line very strongly procurved ; fang-groove of mandible weakly armed	OXYOPES*.

Genus PEUCETIA, Thorell.

Peucetia, *Thorell, Nova Acta Soc. Upsal.* (3) vii, p. 37, 1869 ; *Simon, Hist. Nat. Araign.* ii, p. 378, 1898.

Characters as above.
Type, *P. viridis*, Blackwall.
Distribution. Tropical and temperate countries.

Synopsis of Indian Species †.

a. Carapace and limbs not varied with black spots and lines........................	*P. prasina*, p. 256.
b. Carapace and limbs varied with black spots and lines.	
a[1]. Clypeus with obsolete lateral stripe ; mandibles spotted in front	*P. viridana*, p. 255.
b[1]. Clypeus with distinct lateral stripe ; mandibles with distinct median stripe.	
a[2]. Plates of vulva posteriorly produced and acuminate....................	*P. graminea*, p. 256.
b[2]. Plates of vulva not acuminate posteriorly	*P. procera*, p. 256.

301. **Peucetia viridana**, *Stoliczka, J. A. S. B.* xxxviii, p. 220, t. xx, fig. 1, 1869 (Sphasus) : nigropunctata, *Simon, Ann. Mus. Genova* xx, p. 365, 1884 (Peucetia).

Fig. 86.—*Peucetia viridana*, × 2.

* This genus, which is omitted from the present volume, is represented by many species, mostly of small size, and recognizable by their varied colouring of silvery white and darker stripes.

† *Peucetia elegans*, Blackwall (A. M. N. H. (3) xiv, p. 39, 1864 (*Pasithea*)), from the "East Indies," differs from those here described in having a black band on the lower side of the abdomen. Probably it belongs to the genus *Oxyopes*.

♀. *Colour*: carapace green, sparsely spotted; clypeus with a pair of dark lines running from the anterior eyes; mandibles with a few spots at the base of the setal pores towards the inner side in front and sometimes with one or two forming an imperfect line externally; legs yellow, densely spotted with black; femora often banded with red below; abdomen a rich grass-green, indistinctly banded above and below. *Vulva* with its piriform sclerites transversely truncate behind.

♂. *Palpi* very long; femur arched, tibia about twice as long as patella; external appendix of organ abruptly clavate at tip and armed near the middle with a distinct conical tubercle.

♀. Total length up to about 15 mm., carapace 5, 1st leg 30. ♂. Carapace 4, 1st leg 36.

Loc. Ceylon: Trincomali and Andankalai (*Yerbury*). India: Madras, Pondichery, Chingleput (*Jambunathan*); Ponmudi and Madatory in Travancore (*Ferguson*); Ootacamund (*Hampson*); Calcutta (*Stoliczka*).

302. **Peucetia graminea**, sp. n.

? Peucetia viridana, *Simon, Bull. Mus. Hist. Nat.* 1897, p. 290 (*not of Stoliczka*).

♀. Nearly resembling the preceding in colour, but the clypeus with a very distinct lateral band and the mandibles with distinct anterior dark band; sternum often with median black band. *Vulva* with its sclerites posteriorly narrowed and separated by an angular space.

♂. Palpi a little shorter than in *P. viridana*, the external appendix longer, mesially geniculate, and apically less abruptly clavate.

♀. Total length 15 mm., carapace 4·5, 1st leg 24. ♂. Carapace 3, 1st leg 26.

Loc. Western India: Bulsar in Guzerat (*Wroughton*); ? Karachi.

303. **Peucetia prasina**, *Thorell, Ann. Mus. Genova*, xxv, pp. 10 & 325, 1887: viridana, *Simon, Ann. Mus. Genova*, xx, p. 326, 1884 (*not of Stoliczka*).

Differs from all the preceding species in being tolerably uniform greenish, not lined or spotted with black; the anterior femora reddish and varied with pale lines. *Palp* of male short, the patella not twice as long as broad, and nearly as long as the tibia, which is a little shorter than the tarsus.

Total length (♀) about 13 mm.

Loc. Burma: Minhla (*Comotto*).

304. **Peucetia procera**, *Thorell, Ann. Mus. Genova*, xxv, p. 321, 1887.

♀. Resembling *P. graminea* in colour, but differing in having the plates of the vulva less acuminate behind and separated posteriorly by a much shallower excision.

Total length 14 mm., carapace 4, 1st leg 25.

Loc. Burma: Rangoon (*Oates*); Me-tan-ja (*Fea*).

Family CLUBIONIDÆ.

Hunting Spiders in which the mandibles are powerful, with strongly-toothed fang-groove; the maxillæ project forwards, and are not inclined on the labium and not impressed; the legs are powerful, strongly spined, with tarsi and protarsi scopulate; tarsi furnished with ungual tufts and only two claws; anterior spinners in contact; colulus absent.

The principal Indian species of this family belong to the subfamilies *Selenopinæ* and *Heteropodinæ*, which resemble each other in being laterigrade and in having the maxillæ furnished apically with a very thick tuft of hairs. Their differences may be tabulated as follows:—

a. Claws unarmed; median eyes arranged in a recurved crescent .... *Selenopinæ*, p. 257.
b. Claws armed with teeth; median eyes forming a normal quadrangle ...... *Heteropodinæ*, p. 259.

Subfamily SELENOPINÆ.

Characters as above.

Genus **SELENOPS**, Latreille.

Selenops, *Latreille, Nouv. Dict. d'Hist. Nat.* xxx, p. 579, 1819; *Simon, Hist. Nat. Araign.* ii, p. 26, 1897.

Carapace flat, wider than long; *eyes* of posterior line recurved, laterals prominent, medians close to the anterior medians and forming with them a crescentically recurved line, anterior laterals far from the medians, small; clypeus almost absent. Fang-groove of *mandible* with two posterior teeth.

Type, *S. radiatus*, Latr.

Distribution. Tropical and subtropical countries.

Synopsis of Indian Species.

a. Protarsi of anterior legs with two pairs of spines .... *S. radiatus*, p. 257.
b. Protarsi of anterior legs with three pairs of spines .... *S. montigena*, p. 258.

305. **Selenops radiatus**, *Latreille, Nouv. Dict. d'Hist. Nat.* xxx, p. 579, 1819 (Thomisus); *Simon, Hist. Nat. Araign.* ii, pp. 26 & 27, 1897 (Selenops): malabariensis, *Simon, Act. Soc. Linn. Bord.* xxxiv, p. 234, 1881; *id. Bull. Soc. Zool. Fr.* x, p. 14, 1885: birmanicus *Thorell, Spiders of Burma*, p. 261, 1895.

♀. *Colour* variable, integument yellowish or brown, legs usually banded, hairy clothing mostly yellowish or mouse-brown. *Carapace*

with anterior and posterior median eyes subequal. *Legs* of 1st and 2nd pairs with three pairs of spines on lower side of tibiæ,

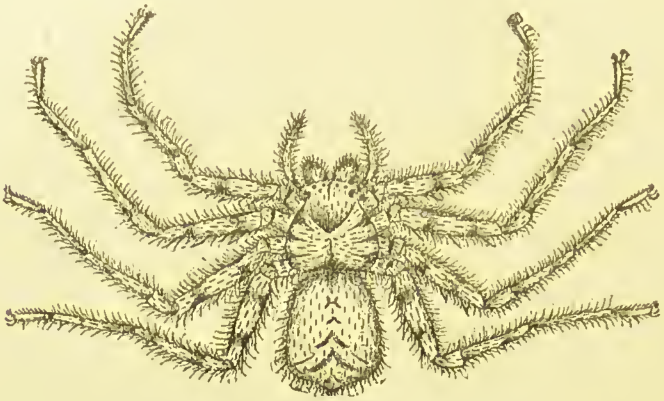

Fig. 87.—*Selenops radiatus*, ♀.

two pairs on protarsi. *Vulva* with lobes meeting in middle line behind and circumscribing a broadly cordate pale area.

♂. Smaller and longer-legged than female; eyes larger. *Palp* with tibial apophysis consisting of two stout conical teeth, one above the other.

Length up to 20 mm. (♀).

Loc. Ormara on the Mekran coast; Karachi (*Townsend*); Bareilly (*Cambridge*); N. Guzerat (*Wroughton*); Tanna (*Edie*); Uran (*Aitken*); Poona (*Wroughton*); Eastern Poona (*Irani*); Eastern Khandesh (*Madan*); Bangalore (*Staunton*); Guntakal and Malabar (*Simon*); Tharrawaddy in Burma (*Oates*). Also Spain, Sokotra, Mauritius, Madagascar, and the whole of Africa as far south as the Zambesi.

306. **Selenops montigena**, *Simon, J. A. S. B.* lviii, p. 335, 1889.

♀. Smaller than *S. radiatus*, with the posterior median *eyes* noticeably larger than anterior medians, and three pairs of spines on the protarsi of the anterior *legs*. *Vulva* with lobes defined in front by a transverse sinuous suture, in contact in front, diverging at an acute angle, separated posteriorly by an elongate heart-shaped space.

Total length 11 mm.

Loc. Jaunsar, 6000 feet (*Oldham*).

Subfamily HETEROPODINÆ.

Characters as specified on p. 257.

Distribution. Tropical countries.

Synopsis of Indian Genera.

a. Eyes of posterior line recurved, the laterals prominent.
 a¹. Carapace with thoracic region low and flat; head considerably elevated ...... PANDERCETES, p. 264.
 b¹. Carapace higher and convex behind; head not or hardly raised.
  a². Maxillæ crested; vulva with two circular pits .... SPARIOLENUS, p. 263.
  b². Maxillæ not crested; vulva not marked with circular pits................ HETEROPODA, p. 259.
b. Eyes of posterior line straight or procurved, the laterals sessile.
 a³. Anterior median eyes smaller than anterior laterals .... PALYSTES, p. 265.
 b³. Anterior medians larger than or as large as anterior laterals.
  a⁴. 2nd leg longer than 1st .... SPARASSUS, p. 266.
  b⁴. 2nd leg not longer than 1st.......... THELCTICOPIS, p. 270.

Genus HETEROPODA, Latreille.

Heteropoda, *Latreille, Nouv. Dict. d'Hist. Nat.* xxiv, p. 135, 1804; *Simon, Hist. Nat. Araign.* ii, p. 54, 1897.

Carapace nearly as wide as long, moderate or very high posteriorly, its upper surface nearly flat; head lightly depressed in front; *eyes* of posterior line recurved, the laterals larger and prominent; eyes of anterior line straight or procurved, laterals larger than medians; quadrangle longer than wide, narrow in front. *Maxillæ* not crested. *Vulva* consisting of a pair of lobes, usually separated by a median skeletal piece, rarely in contact.

Type, *H. venatoria*, Linn.

Distribution. From India eastwards to Australia. (The typical species, *H. venatoria*, which lives in houses, has been introduced by human agency into all tropical countries.)

Synopsis of Indian Species.

Males.

a. Tibial apophysis of palp basal.
 a¹. Abdomen with black yellow-bordered area below .... *H. prompta*, p. 261.
 b¹. Abdomen uniformly pale below .... *H. smythiesi*, p. 262.
b. Tibial apophysis of palp apical.
 a². Apophysis widely bifurcate at tip........ *H. leprosa*, p. 262.
 b². Apophysis not widely bifurcate.
  a³. Apophysis armed with two sharp teeth. *H. venatoria*, p. 260.
  b³. Apophysis not toothed at extremity, pointed.
   a⁴. Distal half of apophysis strongly hooked .... *H. fabrei*, p. 261.
   b⁴. Distal half of apophysis sinuous, only the apex hooked .... *H. sexpunctata*, p. 261.

Females.

a. Abdomen black, with yellow border below .. *H. prompta*, p. 261.
b. Abdomen not darker beneath than at sides.
  a[1]. Carapace shorter than tibia of 3rd leg.... *H. kandiana*, p. 261.
  b[1]. Carapace not shorter than tibia of 3rd leg.
    a[2]. Anterior femora infuscate below.
      a[3]. 4th leg not longer than 1st .... *H. fabrei*, p. 261.
      b[3]. 4th leg longer than 1st.
        a[4]. Carapace strongly elevated behind. *H. plebeia*, p. 262.
        b[4]. Carapace not strongly elevated behind .... *H. leprosa*, p. 262.
    b[2]. Anterior femora not infuscate below.
      a[5]. Anterior median eyes as large as anterior laterals .... *H. lutea*, p. 263.
      b[5]. Anterior median eyes smaller than anterior laterals.
        a[6]. Median sclerite of vulva hammer-shaped .... *H. sexpunctata*, p. 261.
        b[6]. Median sclerite of vulva not hammer-shaped.
          a[7]. Carapace very high behind .... *H. languida*, p. 262.
          b[7]. Carapace low behind.
            a[8]. Lobes of vulva separated by median tongue-shaped sclerite *H. phasma*, p. 260.
            b[8]. Lobes of vulva posteriorly in contact .... *H. venatoria*, p. 260.

307. **Heteropoda venatoria**, *Linn. Syst. Nat.* ed. 12, p. 1035, 1766 (Aranea), *and of recent authors*: ferina, *Simon, J. A. S. B.* lvi, p. 102, 1887 (Heteropoda).

♀. Prevailing colour of hair a greyish mouse-brown above and below; clypeus yellow; usually a yellow black-bordered stripe on the posterior slope of carapace. *Carapace* low, about as long as tibia of 3rd leg; eyes of anterior line with their upper edges on a level, laterals one-third of their diameter larger than medians. *Vulva* with lateral lobes in contact.

♂. Smaller and yellower than female; carapace with large black patch on each side; legs spotted with black. *Legs* much longer than in female; carapace shorter than tibia of 3rd leg. Tibial apophysis of *palp* short, armed with two teeth.

Measurements in mm.—♀. Total length 26, carapace 11, 1st leg 52, 4th 48. ♂. Total length 21, carapace 9·5, 1st leg 56, 4th 48.

Loc. Common in houses in India, Ceylon, and Burma. Artificially introduced from the East into all tropical countries.

308. **Heteropoda phasma**, *Simon, Mém. Soc. Zool. Fr.* x. p. 258, 1897.

♀. Hairy clothing very pale, silky yellowish grey; mandibles shining black. *Eyes* of anterior line more procurved than in *H. venatoria*; the medians about half the diameter of the laterals.

Vulva large, with lobes widely separated by broad tongue-shaped sclerite.

Measurements in mm.—Total length 23, carapace 10, 1st leg 50, 4th 49.

Loc. Himalayas, 6000–7000 ft. (*Smythies*); Kasauli (*Waller Barrow*); Jaunsar and Mundali, 8000 ft. (*Gleadow*).

309. **Heteropoda sexpunctata**, *Simon, Bull. Soc. Zool. Fr.* x, p. 14, t. x, fig. 11, 1885.

♀. Carapace, femora, and upper side of abdomen densely variegated with blackish patches. *Carapace* as wide as long, exceeding tibia of 4th leg. *Legs* short, 4th and 1st subequal. Lobes of *vulva* widely separated, the cleft divided by a narrow crest, the posterior end of which expands like a hammer-head.

♂. Smaller. Tibial apophysis long, slender, acute, spiniform, curved downwards and outwards.

Measurements in mm.—♀. Total length 20, carapace 9, 1st leg 32, 4th 32. ♂. Total length 15, carapace 6·5, 1st leg 31, 4th 27·5.

Loc. India: Tanna; Poona (*Wroughton*); Khandesh; Bellary.

310. **Heteropoda fabrei**, *Simon, Bull. Soc. Zool. Fr.* x, p. 32, t. x, fig. 10, 1885: ? ambigua, *Simon, Ann. Soc. Ent. Fr.* lxv, p. 489, 1896.

♀. *Colour* much as in the preceding, but femora infuscate below. *Vulva* with its lobes separated by a parallel-sided groove. Tibial apophysis of male slender, pointed, with the distal half bent sharply downwards.

Measurements in mm.—♀. Total length 15, carapace 7·5, 1st leg 27·2, 4th 27·5. ♂. Carapace 6·4, 1st leg 30·5, 4th 29·2.

Loc. S. India: Ramnad (*Fabre*); ? Trichinopoly.

311. **Heteropoda kandiana**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 752, 1899.

♀. As large as *H. venatoria*, darker in colour; clypeal band pale, crescentic. *Carapace* shorter than tibia of 3rd leg; *eyes* of anterior line strongly procurved, laterals nearly twice the diameter of the medians, centre of the latter on a level with upper edges of former; clypeus high. *Legs* very long. *Vulva* with lateral lobes separated by broad tongue-shaped sclerite.

Measurements in mm.—Total length 24, carapace 11, 1st leg 58, 4th 59.

Loc. Ceylon: Kandy (*Yerbury*).

312. **Heteropoda prompta**, *O. P. Cambridge, Araneidea, Second Yarkand Exped.* p. 71, 1885 (Sarotes): casaria, *Simon, Mém. Soc. Zool. Fr.* x, p. 259, 1897 (Heteropoda).

♀. Ventral surface much darker than in the other species,

sternum and coxæ nearly black, lower side of abdomen black, bordered with yellow stripes. *Carapace* as long as tibia of 2nd leg; *eyes* of anterior line straight, medians half the diameter of the laterals; clypeus low. *Legs* short. *Vulva* with lobes large, diverging in front, almost in contact behind.

♂. Tibial apophysis rising from base of segment, long, stout, curved, and ending in a thinner hooked portion.

Measurements in mm.—♀. Total length 18, carapace 7, 2nd leg 26, 4th 22·5. ♂. Total length 12·5, carapace 6, 1st leg 34, 4th 27.

Loc. Himalayas: Murree (*Stoliczka*); Jaunsar, Deota, and Konain, 7000 ft. (*Gleadow*).

313. **Heteropoda smythiesi**, *Simon, Mém. Soc. Zool. Fr.* p. 259, 1897.

♂. Allied to *H. prompta* but smaller and paler, obscurely spotted and lined with black; ventral surface pale; apophysis of palp of the same shape and position as in *H. prompta*, but with the terminal portion straighter.

Measurements in mm.—Total length 10, carapace 4·5, 2nd leg 21, 4th 19.

Loc. Dekkan* (*Smythies*); Konain, 7800 ft. (*Gleadow*).

314. **Heteropoda languida**, *Simon, J. A. S. B.* lvi, p. 102, 1887.

♀. Hairy clothing yellowish, femora faintly mottled. *Carapace* as long as 4th tibia, very high behind, the posterior slope forming a right angle with the upper surface. Lobes of *vulva* separated by a narrow groove behind and by a narrow sclerite in front.

Measurements in mm.—Total length 17, carapace 7·5, 2nd leg 30, 4th 29.

Loc. Burma: Tavoy.

315. **Heteropoda leprosa**, *Simon, Ann. Mus. Genova,* xx, p. 336, 1884; *Thorell, Spiders of Burma,* p. 264, 1895.

♀. *Colour* much as in *H. fabrei* apparently; anterior femora infuscate below, mottled with white. *Carapace* as long as tibia of 2nd leg; anterior lateral eyes nearly twice the diameter of the medians. *Legs* short. *Vulva* with lobes widely separated.

♂. Tibial apophysis apically bifurcated.

♀. Total length 13 mm.

Loc. Burma: Minhla (*Comotto*); Rangoon (*Oates*).

316. **Heteropoda plebeia**, *Thorell, Ann. Mus. Genova,* xxv, p. 237, 1887; *Spiders of Burma,* p. 264, 1895.

♀. Differing apparently from *H. leprosa* in having all the femora darker, the sternum and coxæ a brighter red, and the carapace strongly elevated behind as in *H. languida*.

Measurements in mm.—Total length 17, carapace 6·5, 2nd leg 23·5, 4th 23.

Loc. Burma: Rangoon and Kyeikpadam (*Oates*).

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* No doubt an error for Dehra.

317. **Heteropoda lutea,** *Thorell, Spiders of Burma,* p. 265, 1895.

♀. Of a tolerably uniform yellowish colour; limbs mottled with small spots, with a large patch at the base of the tibiæ. *Eyes* of anterior line straight, subequal, about twice their diameter above the edge of the clypeus. *Carapace* a little shorter than tibia of 3rd leg. *Vulva* large, its lobes converging posteriorly, widely separated in front.

Measurements in mm.—Total length 10·5, carapace 5, 2nd leg 29, 4th 24.

Loc. Burma: Tharrawaddy (*Oates*).

The following species of *Heteropoda* are too briefly described to be classified with accuracy, and have been omitted from the synopsis on pp. 259–260 :—

318. **Heteropoda umbrata,** *Karsch, Berl. ent. Zeits.* xxxvi, p. 291, t. xi, fig. 11, 1892.

Colour yellowish, mottled with black. *Carapace* as long as tibia of 4th leg. *Vulva* with lateral lobes posteriorly in contact. Tibial apophysis of *palp* longish, evenly narrowed from base to apex, concave above, convex below. Length 10 mm.
Loc. Ceylon : Peradeniya (*Sarasin*).

319. **Heteropoda eluta,** *Karsch, loc. cit.* p. 291, 1892.

♀. Differs from the preceding at least in having the lobes of the *vulva* widely separated by a median yellow plate. Tibial apophysis of *palp* of ♂ consisting of a sharp process, convex above, concave below, and armed with an inferior basal tubercle. Total length 9 mm.
Loc. Ceylon (*Sarasin*).

320. **Heteropoda subtilis,** *Karsch, loc. cit.* p. 292, t. xi, fig. 13.

♂. Scarcely differing from *H. eluta* in colour and structural features, but with the tibial apophysis of *palp* consisting of a wide sublamelliform tooth. Total length 7 mm.
Loc. Ceylon : Peradeniya (*Sarasin*).

Genus SPARIOLENUS, Simon.

Spariolenus, *Simon, Act. Soc. Linn. Bord.* xxxiv, p. 280, 1881 ; *id. Hist. Nat. Araign.* ii, p. 56, 1897.

Allied to *Heteropoda*, but with the eyes of the anterior line so strongly procurved that the inferior edges of the small medians stand almost on a level with the superior edges of the laterals ; the laterals, moreover, are only about two diameters apart and rather more than a diameter above the edge of the clypeus. The maxillæ are furnished with a distinct median longitudinal crest, which is at most faintly indicated in *Heteropoda*.
Type, *S. tigris*, Simon.
Distribution. India ; Nicobar Islands.

321. **Spariolenus tigris**, *Simon, Act. Soc. Linn. Bord.* xxxiv, p. 281, 1881.

♀. Carapace and abdomen covered with a mixture of rusty-red and white hairs, mottled with black; legs and palpi yellowish, strongly banded with brown. *Carapace* as wide as long, shorter than tibia of 3rd leg. *Legs* very long. *Abdomen* pentagonal; *vulva* consisting of a pair of round pits surrounded by subcircular rings which meet in the middle line.

Measurements in mm.—Total length 13, carapace 6, 2nd leg 37, 4th 34.

Loc. Matheran (*Phipson*); Poona (*Wroughton*); Calcutta (*Oates & Simon*).

Spariolenus megalopis, Thorell (K. Svenska Vet.-Akad. Handl. xxiv, no. 2, p. 77, 1891), based upon an immature female from the Nicobar Islands, is not classifiable.

Genus PANDERCETES, L. Koch.

Pandercetes, *L. Koch, Arachn. Austral.* p. 739, 1875; *Simon, Hist. Nat. Araign.* ii, p. 56, 1897.

Differs from *Heteropoda* in having the thoracic region of the carapace flat and low, and the head raised and sharply defined; eyes much as in *Heteropoda*, those of anterior line straight, quadrangle parallel-sided or nearly so. *Legs* generally plumose.

Type, *P. gracilis*, L. Koch.

Distribution. India to Australia.

Synopsis of Indian Species.

a. Legs not plumose; femora, coxæ, and sternum uniformly pale below (♂) . . . . *P. macilentus*, p. 265.

b. Legs thickly plumose; sternum and coxæ black, anterior femora coloured below (♀).

a[1]. Anterior femora orange-yellow below . . . . . . *P. decipiens*, p. 264.

b[1]. Anterior femora blackish bronze below . . . . *P. celatus*, p. 265.

Fig. 88. *Pandercetes decipiens*, ♀.

322. **Pandercetes decipiens**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 753: ? plumipes, *Karsch, Berl. ent. Zeits.* xxxvi, p. 290, 1892 (Zatapina) (*not of Doleschall*).

♀. *Colour* of upper side greyish and mottled with brown so as to match the lichen-covered bark of trees; coxæ, labium, and sternum shining black, femora of 1st and 2nd legs orange-yellow below. *Carapace* slightly longer than wide; shorter than femur of 1st leg. *Legs* with their margins thickly tufted with hairs. *Abdomen* nearly twice as long as wide.

Total length 16 mm., carapace 7.

Loc. Ceylon: Punduloya (*Green*).

323. **Pandercetes celatus**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 753, 1899.

♀. Distinguishable from the preceding by having the under side of the femora of the 1st and 2nd legs and of the tibiæ of the 3rd and 4th a rich blackish brown tinged with bronze.

Total length 22 mm., carapace 8.

Loc. India: Trivandrum in Travancore (*Ferguson*).

324. **Pandercetes macilentus**, *Thorell, Spiders of Burma*, p. 267, 1895.

♂. *Colour*: body clothed above with yellowish-white hairs varied with brownish patches; lower side of cephalothorax, abdomen, and legs clothed with whitish hairs. *Carapace* about as wide as long, half the length of patella and tibia of 4th leg. *Legs* not plumose. *Palp* with tibial apophysis double, the upper branch slender and pointed, the lower broad and short.

Total length 11 mm., carapace 5.

Loc. S. Tenasserim (*Oates*).

Genus **PALYSTES**, L. Koch.

Palystes, *L. Koch, Arachn. Austral.* p. 701, 1875; *Simon, Hist. Nat. Araign.* ii, p. 65, 1897.

Carapace longer than in *Heteropoda*, more narrowed in front; eyes of posterior line straight, subequal, the laterals not prominent; eyes of anterior line straight or procurved, laterals much larger than medians; clypeus low; 1st leg in ♀ longer than 2nd.

Type, *P. castaneus*, Latreille.

Distribution. Tropical Africa; India to Australia.

Synopsis of Indian Species.

a. Entirely pale above and below .... *P. flavidus*, p. 266.
b. Variegated on under side of body and legs ...... *P. kochi*, p. 265.

325. **Palystes kochi**, *Simon, Act. Soc. Linn. Bord.* xxxiv, p. 265, 1881; *Thorell, Spiders of Burma*, p. 268, 1895: melanichnys, *id. Ann. Mus. Genova*, xxx, p. 53, 1890.

♀. *Colour*: integument of upper side of body and limbs covered with yellowish-white hairs; mandibles blackish, sternum and coxæ black; femora of 1st and 2nd legs and in a lesser degree of 3rd covered with close-set, alternating zigzag stripes of white and brown; tibiæ white with basal and apical black band; lower side of abdomen patched and lined with brown. *Carapace* with summits of eyes of anterior line on a level, laterals about one-fourth of their diameter above edge of clypeus. Lateral lobes of *vulva* meeting posteriorly in a long suture and circumscribing in front a transversely oval pit.

♂. Smaller: femora and tibiæ not variegated below; tibial apophysis of palp short, pointed, and directed downwards.

Measurements in mm.—♀. Total length 29, carapace 15, 1st leg 58, 4th leg 50. ♂. Total length 21, carapace 10, 1st leg 49, 4th 42.

Loc. Sylhet. Burma: Rangoon, Tenasserim (*Oates & Fea*). Also Sumatra.

326. **Palystes flavidus**, *Simon, Ann. Soc. Ent. Fr.* lxv, p. 489, 1896.

♀. Differing from *P. kochi* in being smaller, and entirely pale above and below. *Eyes* of anterior line strongly procurved, laterals and medians subcontiguous, upper edge of former just above centres of medians, laterals more than half a diameter above edge of clypeus. *Vulva* with lateral lobes widely separated by an oblong space occupied by a black V-shaped skeletal piece.

Measurements in mm.—Total length 15, carapace 7, 1st leg 28, 4th 23.

Loc. India: Trichinopoli (*Simon*); Allahabad (*Ryves*); Calcutta.

Genus SPARASSUS, Walck.

Sparassus, *Walckenaer, Tabl. Aran.* p. 39, 1805; *Simon, Hist. Nat. Araign.* ii. p. 46, 1897.

Of much the same form and size as *Heteropoda*, but with the eyes of the posterior line straight or slightly procurved, the laterals sessile, those of the anterior line usually straight and subequal, the laterals not larger than the medians; clypeus very low; tibiæ of anterior legs with only two pairs of inferior spines.

Type, *S. argelasius*, Walck.

Distribution. Tropical countries.

Synopsis of Indian Species.

Males.

a. Tibia of palp with basal and apical apophyses.
  a^1. Basal apophysis strong and trifid .... *S. tarandus*, p. 269.
  b^1. Basal apophysis slender and undivided.... *S. tener*, p. 269.
b. Tibia of palp with only apical apophysis.
  a^2. A triangular process beneath apophysis .. *S. wroughtoni*, p. 268.
  b^2. No strong process beneath apophysis.
    a^3. Abdomen black below in middle ...... *S. lamarcki*, p. 267.
    b^3. Abdomen uniformly pale below.
      a^4. Mandibles brown; carapace as wide as long.......................... *S. impudicus*, p. 268.
      b^4. Mandibles black; carapace longer than wide.
        a^5. Patella of palp unspined, wider than tibia.......................... *S. stimulator*, p. 269.
        b^5. Patella of palp with external spine, not wider than tibia .... *S. phipsoni*, p. 268.

Females.

a. Lateral lobes of vulva almost meeting in the middle line throughout their length ...... *S. lutescens*, p. 269.

b. Lateral lobes of vulva widely separated at least posteriorly.
- *a*[1]. Carapace as long as patella and tibia of 4th leg.............................. *S. hirtus*, p. 267.
- *b*[1]. Carapace shorter than patella and tibia of 4th leg.
  - *a*[2]. Abdomen uniformly pale below........ *S. impudicus*, p. 268.
  - *b*[2]. Abdomen black below in middle.
    - *a*[3]. Cleft of vulva short, oval .... *S. punctipes*, p. 268.
    - *b*[3]. Cleft of vulva long, acutely angular in front.
      - *a*[4]. Tibiæ of legs not spotted; coxæ paler than sternum.............. *S. lamarcki*, p. 267.
      - *b*[4]. Tibiæ of legs spotted; coxæ and legs uniformly black .... *S. senilis*, p. 267.

327. **Sparassus lamarcki**, *Latreille, Gen. Crust. etc.* i, p. 113, 1806 (Thomisus); *Simon, Act. Soc. Linn. Bord.* xxxiv, p. 301, 1881 (Olios).

♀. *Colour*: carapace deep brown, covered with yellowish-white hairs; mouth-parts and sternum black; legs with greyish-yellow hairy clothing; femora white below, mottled with black, with black patch at base and apex, tibiæ with black basal spot; abdomen black below, golden yellow varied with black above. *Carapace* a little longer than wide. *Vulva* with lateral lobes separated by a Λ-shaped cleft occupied by a median black skeletal piece, narrow in front, expanded behind.

♂. Smaller than ♀, paler; sternum, mouth-parts, and lower side of femora reddish, with white hairs; median ventral band of abdomen paler and narrower. Tibial apophysis of *palp* long, pointed, and straightened; palpal organ armed with a great forwardly-directed spike.

Measurements in mm.—♀. Total length 21, carapace 10, 2nd leg 42. ♂. Total length 13, carapace 6, 2nd leg 33·5.

Loc. Ceylon: Kandy and Trincomali (*Yerbury*); Punduloya (*Green*); Peradenyia. India: Chingleput (*Jambunathan*); Coimbatore; Pondichery. Madagascar.

328. **Sparassus senilis**, *Simon, Act. Soc. Linn. Bord.* xxxiv, p. 303, 1881.

♀. Allied to the preceding, but apparently differing in having the coxæ black like the sternum, and the tibiæ spotted below like the femora, the median skeletal piece of the vulva triangular, and the carapace as wide as long.

Measurements in mm.—Length of carapace 8·4, 2nd leg 37·6.

Loc. Ceylon (*Simon*).

329. **Sparassus hirtus**, *Karsch, Zeits. ges. Naturw.* lii, p. 560, 1879 (Pelmopoda).

♀. *Colour* much as in the preceding two species, but with the

femora and tibiæ not spotted below. *Carapace* as long as patella and tibia of 4th leg.

Measurements in mm.—Total length 24, carapace 8·5, 2nd leg 35·5.

Loc. Ceylon (*Nietner*).

330. **Sparassus wroughtoni**, *Simon, Mém. Soc. Zool. Fr.* x, p. 257, 1897.

♂. Differing from ♂ of *S. lamarcki* in having carapace, mouth-parts, legs, and sternum uniformly ochre-yellow, clothed with white hairs; under side of abdomen uniformly pale, upper side with obscure pattern. Tibia of *palp* shorter, its apophysis double, the upper branch long, bent at right angles distally, lower branch short and triangular.

Measurements in mm.—Total length 15, carapace 7, 2nd leg 32.

Loc. North Konkan, Bulsar in Guzerat (*Wroughton*); Matheran (*Phipson*); Uran (*Aitken*).

331. **Sparassus phipsoni**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 752, 1899.

♂. Resembling *S. wroughtoni* in colour, but with mandibles black and a small black patch on base of tibiæ. *Palp* much like that of *S. lamarcki*, but with tibial apophysis lightly concave on inner side when viewed from above, and process on tarsus much shorter and less claw-like.

Measurements in mm.—Total length 19, carapace 9·5, 2nd leg 50.

Loc. Bombay (*Phipson*).

332. **Sparassus impudicus**, *Thorell, Ann. Mus. Genova,* xxv, p. 241, 1887.

♀. Paler and more uniformly coloured than *S. lamarcki*; integument yellowish, covered with white hairs; femora indistinctly mottled below, tibiæ with indistinct basal spot. *Vulva* with median cleft very short and filled with amber-yellow sclerite.

♂. Like ♀ in colour, but with mandibles brown. Tibial apophysis of *palp* stouter than in *S. lamarcki*, with much larger convexity on its inner margin; palpal organ furnished with externally projecting tooth.

Measurements in mm.— ♀. Total length 25, carapace 10, 2nd leg 40. ♂. Total length 17, carapace 8, 2nd leg 44·5.

Loc. Burma: Tharrawaddy (*Oates*); Me-tan-ja (*Fea*); Andaman Islands (*Oates*). Also Sumatra.

333. **Sparassus punctipes**, *Simon, Ann. Mus. Genova,* xx, p. 339, 1884 (Olios); *Thorell, op. cit.* xxv, p. 244 (1887): venustus *et* callipygus, *id. loc. cit.* pp. 248 & 250, 1887: punctipes, var. sordidata, *id. Spiders of Burma,* p. 271, 1895 (Sarotes).

♀. *Colour* variable; typical form not so dark as *S. lamarcki*; sternum and coxæ yellowish brown, extremities of femora, patellæ,

and tibiæ with black rings, femora of anterior two pairs spotted below; ventral area of abdomen not so black. In var. *sordidatus* the whole integument is blackish, and the upper side of the abdomen is scarcely varied. Cleft of *vulva* consisting of a short oval space at posterior end of the plate.

Total length 24 mm., carapace 10, 2nd leg 40.

Loc. Burma: Minhla (*Comotto*); Tharrawaddy (*Oates*).

334. **Sparassus lutescens,** *Thorell, Bih. Sv. Vet.-Akad. Handl.* xx, pt. iv, no. 4, p. 12, 1894; *id. Spiders of Burma*, p. 272, 1895 (Midamus).

♀. Of small size, entirely pale, the protarsi sometimes spotted above at base and apex. *Carapace* as wide as long. *Vulva* with lateral lobes separated throughout their length by a narrow median cleft, each lobe divided by a transverse groove into an anterior larger, darker, and a posterior, smaller, paler portion.

Total length 10 mm., carapace 3·5, 2nd leg 19.

Loc. Burma: Tharrawaddy (*Oates*).

335. **Sparassus tener,** *Thorell, K. Sv. Vet.-Akad. Handl.* xxiv, pt. 1, no. 2, p. 80, 1891.

♂. Colour much as in *S. lutescens*. *Palp* with two long, strong, forwardly-directed tibial apophyses, one external at base, the other inferior at apex.

Total length 7·5 mm., carapace 3·25, 2nd leg 22.

Loc. Assam.

336. **Sparassus tarandus,** *Simon, Bull. Mus. d'Hist. Nat.* 1897, p. 294.

♂. *Colour* pale, carapace with radiating dark stripes; abdomen with median dorsal dark band; mandible brown. *Palp* with two tibial apophyses as in *S. tener*: one at apex, long, slender, acute and sinuous; the other basal, ending in a strong compressed trifid extremity.

Length 12 mm.

Loc. Karachi (*Maindron*).

337. **Sparassus stimulator,** *Simon, Mém. Soc. Zool. Fr.* x, p. 258, 1897.

♂. Nearly allied to *S. phipsoni*, but, according to the description, differing in having the patella of the palp unspined, exceeding the tibia in breadth and equalling it in length.

Total length 18 mm.

Loc. Himalayas, 2000–2800 ft. (*Smythies*).

The following species of *Sparassus*, based upon immature specimens, are not classifiable:—

Sparassus fugax, *O. P. Cambridge, Araneidea, Second Yarkand Exped.* p. 73, 1885.—*Loc.* Murree to Sind Valley (*Stoliczka*).

Sparassus patagiatus, *Simon, Mém. Soc. Zool. Fr.* x, p. 256, 1897.—Dehra Dún (*Smythies*).

Genus THELCTICOPIS, *Karsch.*

Thelcticopis, *Karsch, SB. Ges. Nat. Marburg*, 1884, p. 64.
Thelcticopis+Seramba, *Simon, Hist. Nat. Araign.* ii. p. 72, 1897.

Carapace longer than in *Sparassus*, longitudinally convex; eyes of posterior line procurved, laterals sessile, anterior medians larger than laterals; clypeus low. *Mandible* with fang-groove armed behind with 5–6 small teeth. *Legs* short, less laterigrade, 1st longer than 2nd or equal to it; anterior tibiæ with 5 to 7 pairs of inferior spines. *Spinners* supported on a membranous stalk strengthened by a hairy chitinous ring.

Type, *T. severus*, L. Koch.

Distribution. Ceylon and Burma to the Solomon Islands.

Synopsis of Indian Species.

Males.

a. Tibial apophysis single, long, arcuate ...... *T. nalandicus*, p 270.
b. Tibial apophysis shorter, bifid.
  a^1. Branches of apophysis equal .... *T. canescens*, p. 271.
  b^1. Branches of apophysis unequal .... *T. paripes*, p. 271.

Females.

a. Eyes of both lines subequally spaced; abdomen variegated.
  a^1. Abdomen flavous, variegated with black .. *T. nalandicus*, p. 270.
  b^1. Abdomen black, variegated with pale spots above .... *T. pictus*, p. 271.
b. Lateral eyes further from medians than the latter are from each other.
  a^2. Cleft of vulva narrow, parallel-sided, integument blackish .... *T. canescens*, p. 271.
  b^2. Cleft of vulva oval, narrower behind than in front; integument reddish brown .... *T. birmanicus*, p. 271.

338. **Thelcticopis nalandicus**, *Karsch, Berl. ent. Zeits.* xxxvi, p. 293, pl. xi, fig. 15, 1892: nigropicta, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 573, 1899 (Stasina).

♀. *Colour*: carapace and legs reddish, clothed with whitish hairs intermixed with black; abdomen greyish, variegated above with black spots and stripes. *Eyes* of both lines subequally spaced. Tibiæ of anterior *legs* with 7 pairs of inferior spines.

♂. Smaller than female. Tibial apophysis stout at base, strongly arched, narrow and pointed at apex.

♀. Total length 13·5 mm., carapace 6, 1st leg 18·5.

♂. Total length 9·8 mm., carapace 4 5, 1st leg 18.

Loc. Ceylon: Matale, Nalanda (*Sarasin*); Punduloya (*Green*).

339. **Thelcticopis paripes**, *Karsch, Zeits. Naturw.* lii, p. 559, t. vii, f. 7, 1879 (Themeropis); *id. Berl. ent. Zeits.* xxxvi, p. 293, 1892 (Stasina).

♂. Resembling the preceding, but with the anterior median *eyes* nearer to each other than to the laterals. Tibial apophysis double, consisting of an inner branch, long, crooked, and sharp, and an outer short, conical, diverging at a right angle.

Total length 14 mm., carapace 6, 1st leg 22.

Loc. Ceylon (*Nietner*).

340. **Thelcticopis canescens**, *Simon, J. A. S. B.* lvi, p. 103, 1887.

♀. *Colour*: integument deep reddish brown, hairs on carapace white, on abdomen ashy yellow; ventral area not black. *Tibiæ* of anterior two pairs of legs with 5 pairs of inferior spines. *Vulva* oblong, marked with a median wide reddish groove.

♂. Tibial apophysis of palp consisting of two long subequal smooth processes.

♀. Total length 21 mm., carapace 9, 1st leg 24.

♂. Length of carapace 8 mm., 1st leg 27·7.

Loc. Hills between Burma and Siam.

341. **Thelcticopis birmanicus**, *Thorell, Spiders of Burma*, p. 274, 1895.

♀. Principally differs from *T. canescens* in being of a paler hue, the carapace being reddish and the legs yellowish brown. Cleft of *vulva* broad in front, narrowed behind, occupied by a piriform sclerite.

Total length 14 mm., carapace 6·5, 1st leg 18.

Loc. Tenasserim (*Oates*).

342. **Thelcticopis pictus**, *Thorell, Ann. Mus. Genova*, xxv, p. 254, 1887 (Seramba).

Apparently resembling *T. nalandicus* in most structural characters and in coloration, but with the hairy clothing of the carapace and legs olive-yellow; the abdomen black, ornamented above with pale spots and stripes. Anterior tibiæ armed below with 5 pairs of spines. Cavity of *vulva* nearly circular, occupied by **Y**-shaped sclerite.

Total length 21 mm.

Loc. Burma: Shwegoo Myo (*Fea*).

The following species of this family, based upon an immature female example, is of doubtful generic position:—

Holconia armillata, *Thorell, Ann. Mus. Genova*, xxv, p. 233, 1897.—*Loc.* Burma; Shwegoo Myo (*Fea*).

Family PLATORIDÆ.

Body very flat, legs completely laterigrade; *carapace* much wider than long, head narrow. *Mandibles* weakly armed, labium longer than wide, maxillæ directed obliquely inwards. *Sternum* much wider than long, not narrowed behind. Coxæ of *legs* long, the posterior widely separated, 1st leg shorter than the rest, 2nd longest; no scopulæ or ungual tufts; anterior legs armed with erect spiniform bristles; claws two in number and toothed. Spinners short, those of anterior pair widely separated, the intermediate pair occupying the space between them.

Distribution. North India; China; S. America.

Genus PLATOR, Simon.

Plator, *Simon, Ann. Soc. Ent. Fr.* (5) x, p. 105, 1880; *Hist. Nat. Araign.* ii. p. 18, 1897.

Characters as above.

Type, *P. insolens*, Sim.

Distribution. N. India; China.

343. **Plator indicus**, *Simon, Mém. Soc. Zool. France*, x, p. 256, 1897 (♂): ixodinus, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 753, 1899 (♀).

♀. *Colour*: carapace and legs reddish yellow; carapace black about the eyes, and with narrow black marginal line; posterior legs with black line running down the middle of patella, tibia, and protarsus; abdomen olive-green, paler below, darker round edge.

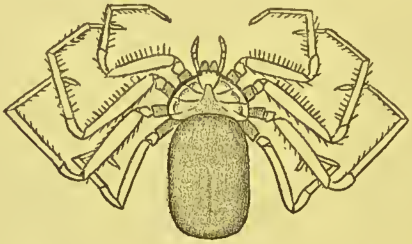

Fig. 89.—*Plator indicus*, ♀, ×2.

Eyes of anterior line distinctly separated; anterior legs furnished below with many spiniform setæ, stronger on the protarsus than elsewhere. *Vulva* consisting of a large piriform horny plate, furnished posteriorly with a pair of crescentically-curved darker contiguous thickenings.

♂. Much like ♀, but with anterior eyes larger and almost in contact.

Total length about 10 mm.

Loc. Himalayas and Western India: Poona and Konkan (*Simon*); Konain, 7800 ft.; Mundali, 8000 ft. (*Gleadow*); Dalhousie (*Townsend*).

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